

Heart Disease and Stroke in California: Surveillance and Prevention



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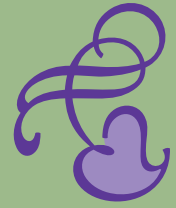
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Highlights



Prevalence of Risk Factors for Heart Disease and Stroke

Smoking

- In 1999, 19.2 percent of California adults were smokers. This is a decrease since 1984 when 23.6 percent of California adults were smokers.
- In California, more men smoke than women, although the prevalence of smoking has been dropping. In 1999, 21.6 percent of men smoked while 16.8 percent of women smoked.
- The average prevalence of current smokers for 1997–99 was highest for blacks at 24.9 percent. The next highest estimates were observed in whites (20.2 percent), Hispanics (15.5 percent), and Asian/Pacific Islanders (10.1 percent).

Diabetes

- In 1999, the overall prevalence of California adults who had ever been told by a health professional that they had diabetes was 6.1 percent. This is an increase from the 1984 estimate of 4.7 percent.
- In 1999, 6.0 percent of men and 6.4 percent of women reported having ever been told by a health professional that they had diabetes.
- The average prevalence (1997–99) of diabetes was highest in the Hispanic population (10.6 percent). Asian/Pacific Islanders had the second highest average prevalence of diabetes (8.4 percent) followed by blacks (7.5 percent). The lowest average prevalence was seen in whites (4.6 percent).

Overweight and Obesity

- The prevalence of California adults who are obese (body mass index ≥ 30) has more than doubled from 7.4 percent in 1984 to 17.6 percent in 1999.
- In 1984, 30.2 percent of adults had a body mass index that classified them as overweight ($25 \leq$ body mass index ≤ 29.9) compared with 35.2 percent in 1999.
- In 1999, there were more men who were overweight (44.1 percent) compared with women (26.2 percent). However, for the same year, there were more women who were obese (18.5 percent) compared with men (16.7 percent).
- Hispanics had the highest average prevalence (1997–99) of overweight (38.8 percent) and obesity (23.3 percent).
- Blacks had the second highest average prevalence (1997–99) of overweight (37.9 percent) and obesity (22.8 percent).
- Whites had the third highest average prevalence (1997–99) of overweight (33.9 percent) and obesity (15.2 percent).
- Asian/Pacific Islanders had the lowest average prevalence (1997–99) of overweight (26.6 percent) and obesity (5.6 percent).

Physical Inactivity

- The statewide prevalence of physical inactivity among adults has remained relatively stable during the period 1984–98. In 1998, 50.3 percent of California adults were physically inactive.

- There was a slightly higher prevalence of physically inactive women (50.9 percent) compared with men (49.5 percent) in 1998.
- In 1998, Hispanics had the highest prevalence of physical inactivity (65.7 percent) followed by Asian/Pacific Islanders (52.4 percent), blacks (47.8 percent), and whites (45.5 percent).

High Blood Pressure

- In 1999, the prevalence of high blood pressure among California adults was 23.7 percent. This estimate has decreased slightly since 1984 when 24.1 percent of California adults reported having ever been told by a health professional that they had high blood pressure.
- In 1999, a slightly higher prevalence of California men (24.2 percent) compared with women (23.3 percent) had ever been told by a health professional that they had high blood pressure.
- Blacks had the highest average prevalence (1997–99) of high blood pressure (34.3 percent). This was followed by the average prevalence of high blood pressure among whites (22.2 percent), Hispanics (20.9 percent), and Asian/Pacific Islanders (20.2 percent).

High Blood Cholesterol

- The percentage of California adults who reported having ever had their blood cholesterol measured increased from 49.6 percent in 1987 to 71.5 percent in 1999. In 1987, 17.7 percent of those who had their blood cholesterol checked reported having been told that they had high cholesterol. This figure increased to 27.5 percent by 1999.
- In 1999, a lower percentage of California men reported having ever had their blood cholesterol checked (69.6 percent) compared with women (73.6 percent). Of those who had their cholesterol checked, a higher prevalence of men (28.7 percent) compared with women (26.2 percent) had been told by a health professional that they had high cholesterol.

- The average prevalence (1997 and 1999) of California adults who had ever had their cholesterol screened was highest among whites (76.8 percent), followed by blacks (71.5 percent), Asian/Pacific Islanders (71.2 percent), and Hispanics (59.8 percent). Of those screened, high cholesterol was found in about the same proportion among all race/ethnic groups. The average prevalence (1997 and 1999) was highest in blacks (29.1 percent), followed by Asian/Pacific Islanders (29.0 percent), whites (27.7 percent), and Hispanics (27.0 percent).

Hospitalizations: Heart Disease

- Heart disease accounted for 187,714 hospitalizations in California in 1999.
 - 60 percent were men.
 - 62 percent were over the age of 65 years.
 - 70 percent were white.
- The statewide age-adjusted hospitalization rate due to heart disease was 6.3 per 1,000 in 1999.
- In 1999, total hospital charges for heart disease was \$6.0 billion in California.
- Men had a higher heart disease hospitalization rate (8.4 per 1,000) than women (4.6 per 1,000) in 1999.
- Blacks had the highest heart disease hospitalization rate (7.4 per 1,000) followed by whites (6.6 per 1,000), Hispanics (5.3 per 1,000), and Asian/Pacific Islanders (4.1 per 1,000).

Hospitalizations: Stroke

- Stroke accounted for 96,208 hospitalizations in California in 1999.
 - 54 percent were women.
 - 76 percent were over the age of 65 years.
 - 68 percent were white.
- The age-adjusted hospitalization rate due to stroke was 3.3 per 1,000 in 1999.
- In 1999, total hospital charges for stroke totaled \$2.1 billion in California.

- Men had a higher stroke hospitalization rate (3.5 per 1,000) than women (3.1 per 1,000) in 1999.
- Blacks had the highest stroke hospitalization rate (5.0 per 1,000) followed by whites (3.2 per 1,000), Hispanics (2.8 per 1,000), and Asian/Pacific Islanders (2.6 per 1,000).

Deaths: Heart Disease

- In 1999, there were 58,476 deaths due to heart disease in California. This was 26 percent of the total number of deaths from all causes.
- The age-adjusted heart disease death rate in California decreased from 337.0 per 100,000 in 1979 to 204.0 per 100,000 in 1999.
- In general, men have a higher death rate due to heart disease than women, however, this gap has been narrowing over time. Death rates due to heart disease among men have been declining faster than death rates among women.
- In 1999, the age-adjusted heart disease death rate for California men was 250.4 per 100,000 compared with 167.7 per 100,000 for women.
- Age-adjusted death rates due to heart disease have consistently been highest among blacks. In 1999, the age-adjusted heart disease death rate for blacks was 305.6 per 100,000. This rate was followed by 218.7 per 100,000 for whites, 137.7 per 100,000 for Hispanics, and 129.1 per 100,000 for Asian/Pacific Islanders.

Deaths: Stroke

- In 1999, there were 18,079 deaths due to stroke in California. This was eight percent of the total number of deaths from all causes.
- Overall, the age-adjusted stroke death rate for California has decreased from 101.0 per 100,000 in 1979 to 63.3 per 100,000 in 1999.
- During the 1979–99 period, age-adjusted stroke death rates decreased for both men and women in California. In 1999, the age-adjusted stroke death rate for women was 61.5 per 100,000 compared with 64.7 per 100,000 for men.
- Age-adjusted death rates due to stroke have been highest among blacks. The age-adjusted stroke death rate for blacks was 98.6 per 100,000 in 1999. This rate was followed by 64.4 per 100,000 for whites, 58.0 per 100,000 for Asian/Pacific Islanders, and 42.9 per 100,000 for Hispanics.



Introduction



In public health, cardiovascular disease typically refers to a wide variety of heart and blood vessel diseases, including coronary heart disease, hypertension, stroke, and rheumatic heart disease.¹ This report focuses on ischemic heart disease and stroke, specifically.

In California and the nation, more people die each year from cardiovascular disease than from any other cause.² In California, heart disease and stroke have consistently been the first and third leading causes of death, respectively. In 1999, there were 58,476 people who died from heart disease and 18,079 people who died from stroke in California.

Efforts must be made to decrease the burden of heart disease and stroke in California. This can be accomplished through community activities, advocacy, and environmental changes, policy change, collaborations, and individual behavior modification. Fortunately, many of the factors that increase the likelihood of developing heart disease or suffering a stroke can be prevented, or at least controlled. Tobacco smoking, diabetes, overweight and obesity, physical inactivity, high blood pressure, and high blood cholesterol can all increase an individual's risk of experiencing a cardiac event or stroke. By modifying behaviors to

follow a more healthy way of life, it is possible to decrease one's risk of developing heart disease or experiencing a stroke.

The purpose of this document is to describe the burden of heart disease and stroke in California and the means to help prevent future disease through risk modification. The prevalence estimates of modifiable risk factors are examined along with a discussion of how each risk factor is related to the development of heart disease and stroke. Some suggestions for public health action to decrease the prevalence of these risk factors in the population are provided. Information on clinical treatment and disease management of heart disease and stroke is presented. Hospitalizations, costs, and mortality due to heart disease and stroke are shown in order to illuminate the burden of these diseases on state resources and the population. However, it is important to emphasize that this is only a partial picture of burden, since disability from both heart disease and stroke, costs of chronic care, and years of lost productivity are not included in this report.

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Risk Factors For Heart Disease and Stroke



It is possible to reduce the risk of heart disease and stroke as well as to decrease the burden of these diseases by modifying behaviors in

daily life. Smoking, diabetes, overweight and obesity, physical inactivity, high blood pressure, and high blood cholesterol can all increase the risk of heart disease and stroke. The following section includes:

1) descriptions of how these risk factors contribute to heart disease and stroke, 2) descriptions of how to reduce these risk factors, and 3) presentations of risk factor prevalence data obtained from the California Behavioral Risk Factor Survey (see Appendix 1 for more information). Data are for adults (aged 18 and older) and have been age-adjusted to the 2000 U.S. standard population.

Smoking

Smoking: Background

The Centers for Disease Control and Prevention (CDC) estimates that 20 percent of all deaths in the United States are due to cigarette smoking. About 40 percent of those deaths result from cardiovascular disease.¹

Cigarette smoking contributes to cardiovascular disease in several ways. Carbon monoxide found in cigarette smoke affects the heart by reducing the amount of oxygen the blood is able to carry. Nicotine, also found in cigarette smoke, causes an increase in heart rate and blood pressure, which causes extraordinary “wear and tear” on the cardiovascular system. Blood pressure is increased because cigarette smoke makes blood vessels constrict, and because it contributes to the development of atherosclerosis, or a build-up of fat and cholesterol in the arteries.^{1,2}

Some facts about cigarette smoking and cardiovascular disease in the United States include:

- Cigarette smokers of any age have a 70 percent greater heart disease death rate than do nonsmokers.³
- Compared with nonsmokers, smokers are two times more likely to suffer heart attacks and strokes.³

- Smoking increases the risk of stroke by 40 percent in men and 60 percent in women.⁴
- When people stop smoking, regardless of how long they smoked, their risk of heart disease and stroke declines rapidly.⁵
- In 1993, CDC estimated total direct costs for smoking-related medical care at \$50 billion. An average of 14.4 percent of total state Medicaid expenses were found to be attributable to cigarette smoking.¹

Exposure to secondhand smoke is also associated with increased risk of heart disease:

- Exposure to secondhand smoke is the third leading preventable cause of death in the United States, behind active smoking and alcohol.⁶
- Each year, 53,000 Americans will die due to exposure to secondhand smoke. Of those, 37,000 will die of heart disease.^{7,8}
- Men and women nonsmokers exposed to environmental tobacco smoke at home have a 30 percent increased risk of dying from heart disease.^{8,9}
- The U.S. Environmental Protection Agency classified secondhand smoke as a Group A carcinogen. This category includes only the most dangerous substances, such as asbestos and radon.¹⁰

Smoking: Opportunities for Action

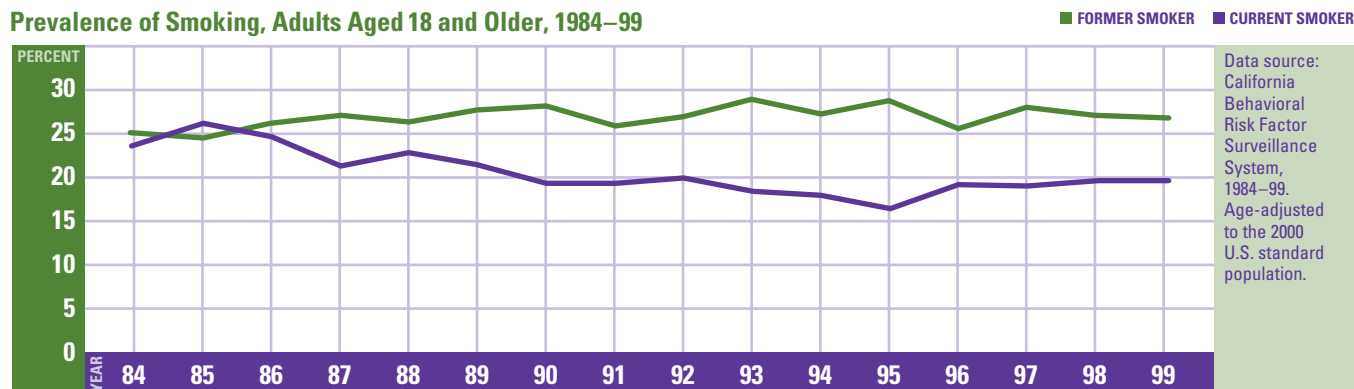
To reduce the risk of cardiovascular disease due to tobacco smoke, public health professionals and community leaders can:

- Work with your Local Lead Agencies (LLAs) located in all county and city health departments. LLAs are responsible for developing comprehensive tobacco control programs focusing on reducing exposure to secondhand smoke, countering pro-tobacco influences in the community, reducing the availability of tobacco products, and making cessation services available. Each LLA has a tobacco control coalition that assists in developing and implementing community tobacco control efforts and develops and demonstrates widespread public support for issues, actions, and unmet needs. Contact your local health department to find the LLA contact person.
- Promote the California Smokers' Helpline (1-800-NO-BUTTS or <http://www.nobutts.org>). Anyone in California can call, whether he or she is currently smoking, has already quit, or wants information for a friend or relative. The Helpline is available in five languages. The line can also accommodate the hearing impaired.
- Encourage physicians and other health care practitioners to incorporate smoking prevention and cessation counseling into their patient visits. Clinical counseling can change smoking behavior, even when the intervention is brief. Smokers view physicians as credible and persuasive, and physician visits represent teachable moments when health concerns are salient.¹¹ Counseling, with adjunct therapy of nicotine patches or gum for some patients, is recommended.¹²
- Contact the Tobacco Control Section (TCS) of the California Department of Health Services at (916) 327-5425 or visit TCS' web site at <http://www.dhs.ca.gov/tobacco> for a full list of resources.



Smoking: California Surveillance Data

Prevalence of Smoking, Adults Aged 18 and Older, 1984–99



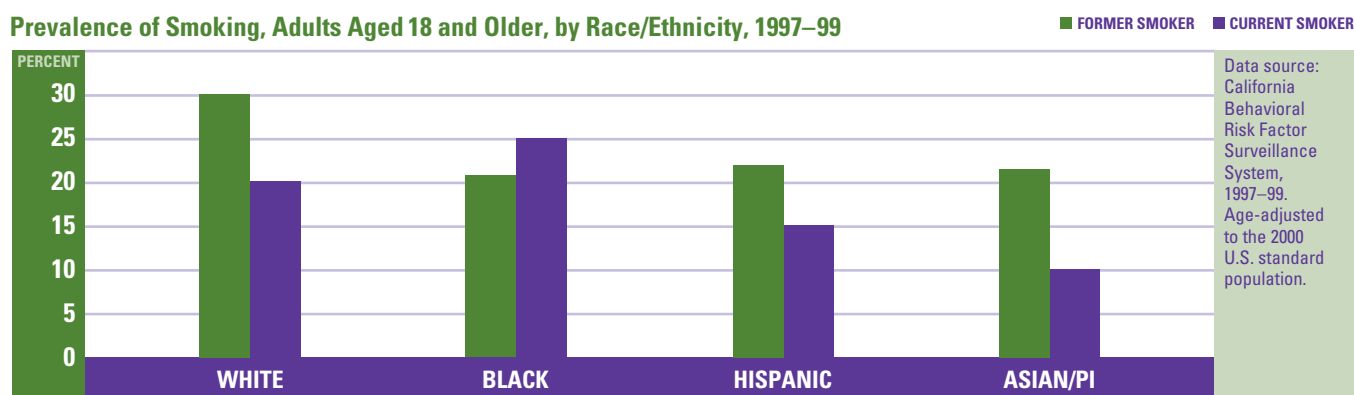
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The prevalence of current smokers in California has decreased over time. In fact, the prevalence of smoking in California is one of the lowest in the nation.¹³ In 1984, 23.6 percent of adults were categorized as current smokers. This percentage decreased to 16.1 percent in 1995. There was a slight increase between 1996 (18.6 percent) and 1999 (19.2 percent) in overall prevalence of current smokers. This increase is due almost exclusively to an increase in occasional smokers, with the

18- to 25-year-old age group showing the greatest increase.¹⁴

The prevalence of current smokers among women has been consistently lower than for men during the 1984–99 period. In 1984, 21.6 percent of women were current smokers compared with 25.4 percent of men. Over time, the percentage of women who were current smokers decreased to 16.8 percent while the percentage of men decreased to 21.6 percent in 1999. (Data not shown.)

Prevalence of Smoking, Adults Aged 18 and Older, by Race/Ethnicity, 1997–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The average prevalence of current smokers for 1997–99 was highest for blacks at 24.9 percent. Whites had the second highest average prevalence

(20.2 percent) followed by Hispanics (15.5 percent). Asian/Pacific Islanders had the lowest average prevalence of current smokers (10.1 percent).

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Diabetes

Diabetes: Background

Diabetes is a group of diseases in which the body is unable to use glucose (sugar) properly. Normally, insulin takes glucose out of the blood stream and moves it into tissues for energy. When a person has diabetes, either the body does not make enough insulin, or the body cannot use insulin properly. Glucose then builds up in the bloodstream, which damages blood vessels and nerves and may lead to problems such as blindness, kidney failure, and lower limb amputations. In fact, diabetes is the leading cause of these serious problems. Significant evidence indicates that blood glucose control is necessary to delay or avoid these complications.^{1,2,3} Diabetes is also a significant contributor to heart disease and stroke, but the underlying mechanism for this is not yet well understood.⁴

Some facts about diabetes and cardiovascular disease include:

- Persons with diabetes are two to four times as likely to die from coronary heart disease, and twice as likely to die from stroke, compared with persons without diabetes.⁵ In fact, more than 80 percent of people with diabetes die of some form of cardiovascular disease.⁶
- About 7.3 percent of the adult U.S. population has diagnosed diabetes.⁷ It is thought that an additional one-third is undiagnosed, making the total in the United States approximately 16 million in 2001.⁸
- A study from the American Diabetes Association estimates the direct medical costs of diabetes in 1997 at \$44.1 billion, and indirect costs at \$54.1 billion, totaling over \$98 billion.⁴



Diabetes: Opportunities for Action

Type 1 diabetes, formerly called insulin-dependent diabetes mellitus (IDDM), is an autoimmune disorder that damages beta cells in the pancreas, which normally produce insulin. This type of diabetes is usually diagnosed in childhood. Though beta cell damage occurs weeks or months in advance of onset, type 1 diabetes seemingly appears suddenly and progresses quickly. People with this type of diabetes must inject insulin daily to stay alive. Physical activity and a healthy meal plan are disease management components. Type 1 diabetes accounts for about ten percent of all known cases of diabetes.

Type 2 diabetes, formerly known as non-insulin dependent diabetes mellitus (NIDDM), is a disease involving insulin resistance and insulin production defects.⁹ It usually occurs in adults over 40 years of age that are overweight. However, there has been an increase in the prevalence of type 2 diabetes in children and adolescents. In type 2 diabetes the pancreas makes insulin but the body is unable to use it properly. Its onset is usually gradual and can go undetected for many years. Type 2 diabetes can often be controlled or managed through diet and exercise. However, some people also need oral medications or insulin to help control blood sugar levels. Recent studies indicate that type 2 diabetes is largely preventable through eating a nutritious diet, weight management, and regular exercise.^{3,10} Type 2 diabetes accounts for about 90 percent of all known cases of diabetes.

Risk factors for type 2 diabetes are:

- Over 45 years of age
- Family history
- Overweight or obese
- Physical inactivity
- Low HDL (high density lipoprotein) cholesterol (good) or high triglycerides, and high blood pressure
- African American, Asian/Pacific Islander, Hispanic, or Native American race/ethnicity
- Women who have a history of gestational diabetes or who gave birth to a baby weighing over nine pounds

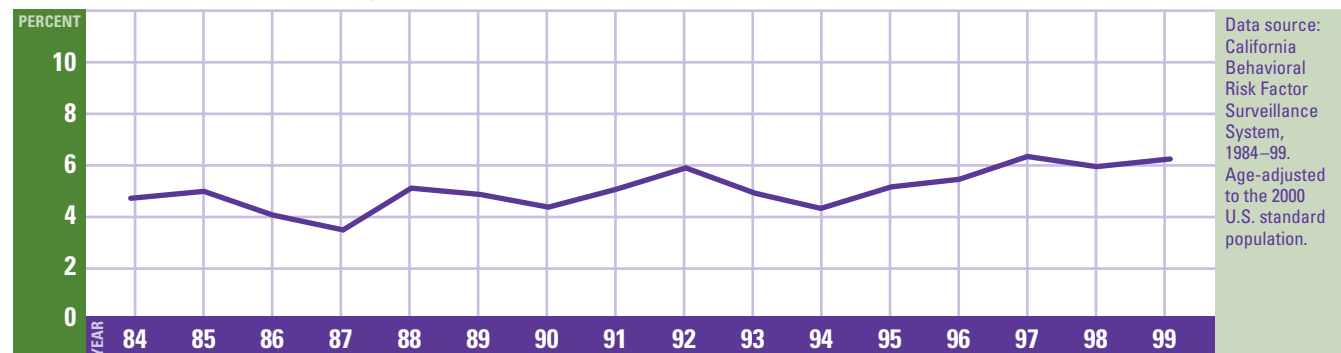
In California, there are approximately two million people with diabetes, and among these people, an estimated 600,000 people have diabetes and do not know it. Prevention and treatment of diabetes could have a major impact on morbidity and mortality associated with cardiovascular disease.¹¹

To reduce the risk of cardiovascular disease due to diabetes, public health professionals and community leaders can see the following resources:

- California Diabetes Control Program: call (916) 445-3548 for more information on patient and medical professional training tools and other materials.
- National Diabetes Education Program web site: <http://www.ndep.nih.gov>

Diabetes: California Surveillance Data

Prevalence of Diabetes, Adults Aged 18 and Older, 1984–99

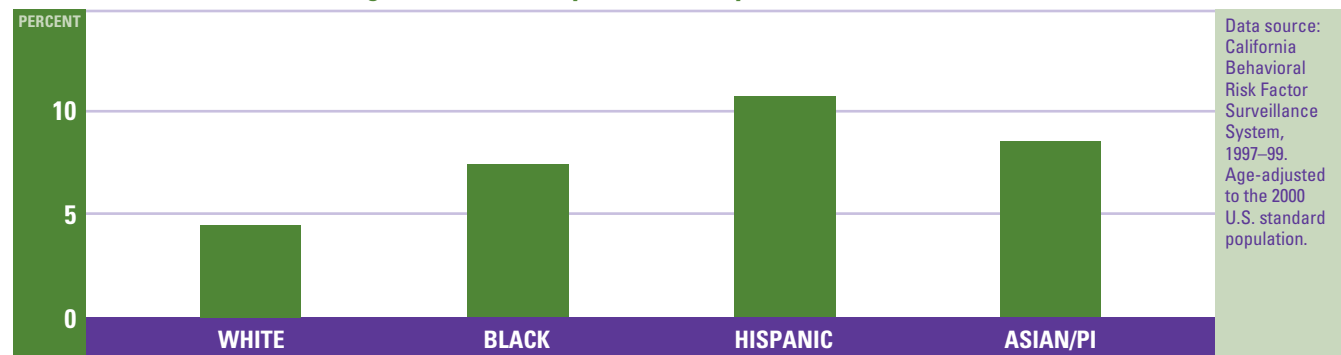


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The prevalence of California adults who reported having ever been told by a health professional that they had diabetes has increased slightly over time. In 1984, 4.7 percent of California adults reported having diabetes. This figure increased to 6.1 percent in 1999.

The prevalence of men and women who have been told they have diabetes showed a slight increase during 1984–99. Approximately 6.0 percent of men and 6.4 percent of women were told by a health professional that they had diabetes in 1999. (Data not shown.)

Prevalence of Diabetes, Adults Aged 18 and Older, by Race/Ethnicity, 1997–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The average prevalence (1997–99) of diabetes was highest in the Hispanic population (10.6 percent). Asian/Pacific Islanders had the second highest prevalence of diabetes (8.4 percent)

followed by blacks (7.5 percent). The lowest three-year average prevalence was observed in whites (4.6 percent).

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Overweight and Obesity

Overweight and Obesity: Background

Overweight and obesity are defined using a measure called body mass index, or BMI. The formula for this measure is: $BMI = [\text{weight in kg}/(\text{height in m})^2]$. A person with a BMI of 30 or greater is considered obese. Persons with a BMI of 25 to 29.9 are considered overweight.

Overweight and obesity are one of the most prevalent public health problems in California. Overweight and obesity are associated with an increased risk for high blood pressure, high blood cholesterol, and diabetes, and are independent risk factors for heart disease.^{1,2,3} There are several ways that overweight and obesity contribute to these conditions. For example, obesity interferes with cholesterol metabolism, resulting in elevated blood cholesterol. It may also alter glucose metabolism, which can result in diabetes. It is encouraging that studies have shown a reduction in body weight in overweight individuals can lower blood pressure and improve blood cholesterol levels significantly.²

Many studies have examined the relationship between cardiovascular disease and overweight and obesity.^{1,4,5,6} The Nurses' Health Study, an eight-year evaluation of 115,886 healthy women aged 30 to 55 years, examined the incidence of nonfatal and fatal coronary heart disease in relation to obesity and concluded that obesity

is a strong risk factor for heart disease. The researchers found that being overweight is associated with approximately 40 percent of all heart disease in U.S. women, and gaining 20 extra pounds during adulthood doubles the risk.⁵ Moreover, data from the Framingham Heart Study have shown that weight gain during adulthood increased the risk of cardiovascular disease in both sexes that could not be attributed to either initial weight or risk factors related to weight gain.⁶

Other facts about overweight and obesity in the United States include:

- The National Center for Health Statistics estimates that over a third of the adult U.S. population is obese.⁷
- The prevalence of obesity (BMI over 30) has increased from 12.0 percent in 1991 to 17.9 percent in 1998; with an increase from 7.1 percent to 12.1 percent among 18- to 29-year-olds.⁸
- Compared with the general population, minority populations have significantly higher rates of overweight and obesity, with 46.7 percent of Hispanic and 48.6 percent of black women classified as overweight or obese.⁷
- In men and women under age 50, a body weight greater than 130 percent of desirable weight for height is associated with twofold increases in the risk of developing coronary heart disease.⁹

Overweight and Obesity: Opportunities for Action

Weight control is a matter of balance between energy consumed and energy expended by the body. See the section “Physical Inactivity: Opportunities for Action” for ideas on how to increase physical activity in the community. Suggestions for improving diet include promoting the consumption of a minimum of five fruits and vegetables per day and maintaining a diet that includes low-fat, low-saturated fat, and low-cholesterol foods, low-fat or fat-free dairy foods, plenty of whole grain products, and moderate intake of alcoholic beverages.

The Centers for Disease Control and Prevention (CDC) promotes four major strategies to reducing obesity: increase physical activity, decrease television watching, increase breastfeeding, and follow the “5-a-day” (fruits and vegetables) recommendation.¹⁰

The above strategies focus on changing the behavior of individuals. While this is necessary, it is probably not sufficient. In order to effectively prevent and treat overweight and obesity, it has been argued that an environmental approach is vital.^{11,12} Barriers to healthy food choices and active lifestyles within our society must be addressed.

To reduce the risk of heart disease and stroke due to obesity, public health professionals and community leaders can see the following web sites:

- <http://www.health.gov/dietaryguidelines>

This web site provides information on the promotion of the Dietary Guidelines for Americans.

- <http://www.dhs.ca.gov/cpns/network/index.html>
<http://www.dhs.ca.gov/lean>

These web sites provide information on California Department of Health Services’ programs, the Nutrition Network for Healthy, Active Families and California Project LEAN (Leaders Encouraging Activity and Nutrition). Both programs promote healthy eating and increasing physical activity.

- <http://thecommunityguide.org>

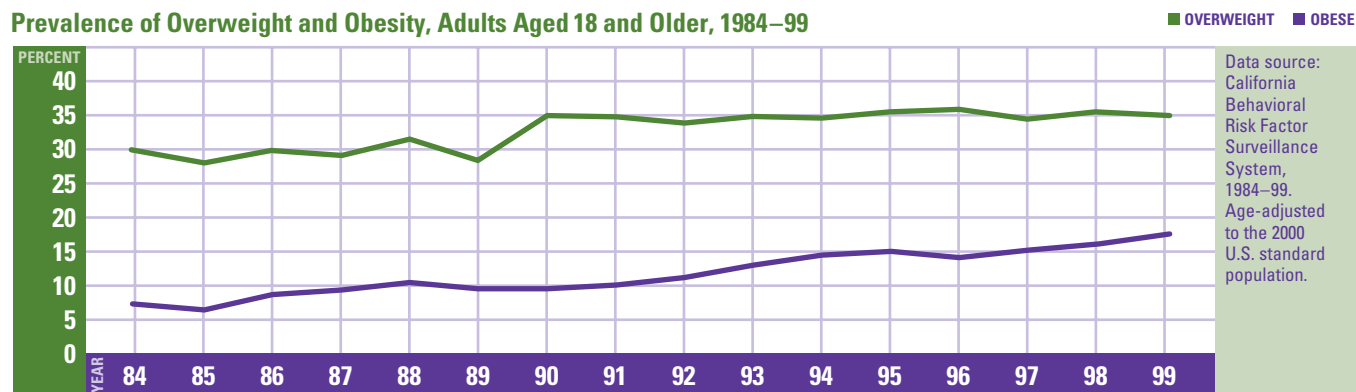
Click on “publications” to find information on a Morbidity and Mortality Weekly Report (MMWR) describing population-based strategies to increase physical activity levels.

- <http://www.astphnd.org/programs/guidelines.htm>

This web site of the Association of State and Territorial Public Health Nutrition Directors contains a publication released in February 2002 called “Guidelines for Comprehensive Programs to Promote Healthy Eating and Physical Activity.” These guidelines were developed by the Nutrition and Physical Activity Work Group, a consultative group to CDC, to assist organizations at the state and local levels in creating comprehensive nutrition, physical activity, and obesity control programs.

Overweight and Obesity: California Surveillance Data

Prevalence of Overweight and Obesity, Adults Aged 18 and Older, 1984–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

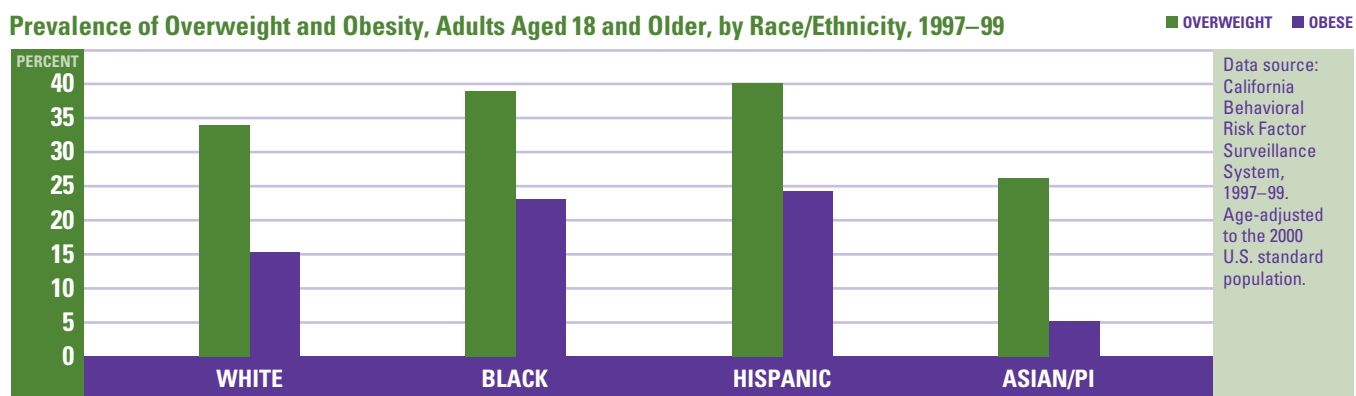
BMI was calculated from self-reported height and weight using the formula of $BMI = [\text{weight in kg}/(\text{height in m})^2]$. A person with a BMI of 30 or greater is considered obese. Persons with a BMI of 25 to 29.9 are considered overweight. These standards are consistent with the *Executive Summary of Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*, NHLBI, 1998.

The prevalence of obesity among California adults more than doubled during the years of 1984–99. In 1984, 7.4 percent of adults had a BMI that classified them as being obese. This figure grew to 17.6

percent in 1999. There has also been a substantial upward trend in the prevalence of overweight among California adults. In 1984, 30.2 percent of adults had a BMI that classified them as overweight compared with 35.2 percent in 1999.

In 1999, the percentage of men who were overweight exceeded the percentage of women; approximately 44.1 percent of men were overweight and 26.2 percent of women. However, there were more women than men classified as obese. There were 18.5 percent of adult women compared with 16.7 percent of adult men classified as obese in 1999. (Data not shown.)

Prevalence of Overweight and Obesity, Adults Aged 18 and Older, by Race/Ethnicity, 1997–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The average prevalence (1997–99) of both overweight and obesity followed similar patterns across the different race/ethnic groups. Hispanics had the highest three-year average prevalence of overweight (38.8 percent) and obesity (23.3 percent). Blacks had the second highest prevalence of

overweight (37.9 percent) and obesity (22.8 percent). There were 33.9 percent of whites classified as overweight and 15.2 percent classified as obese. The average prevalence estimates of overweight (26.6 percent) and obesity (5.6 percent) were lowest among Asian/Pacific Islanders.

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Physical Inactivity

Physical Inactivity: Background

The Centers for Disease Control and Prevention (CDC) and the National Institutes of Health recommend accumulating a minimum of at least 30 minutes of moderate-intensity physical activity on most days of the week. In 1996, the Report of the Surgeon General on Physical Activity and Health summarized the many health benefits of such regular exercise. According to this report, more than 60 percent of U.S. adults do not achieve this level of activity, which is necessary to reduce the risk of premature mortality and morbidity due to chronic disease. Physical inactivity almost doubles the chance of dying from coronary heart disease.¹

Physical activity refers to any movement of the body that increases energy expenditure. Regular physical activity leads to a multitude of changes in the body, including decreasing resting heart rate and blood pressure (in those with high blood pressure), and increasing maximal stroke volume and cardiac output.¹ Physical activity also positively affects the respiratory, neuromuscular, skeletal, endocrine, metabolic, and immune systems.¹ It also reduces symptoms of anxiety and depression and fosters improvements in mood and feelings of well-being.

Physical *inactivity* is more common among:²

- Women than men
- African American and Hispanic adults than whites
- Older than younger adults
- Less educated than more educated people

Physical Inactivity: Opportunities for Action

CDC's Task Force on Community Preventive Services promotes the following evidence-based strategies for increasing physical activity:

- Community-wide campaigns
- Individually-adapted health behavior change programs
- School-based physical education
- Social support interventions in community settings
- Creating or improving access to places for physical activity combined with informal outreach

To reduce the risk of cardiovascular disease due to physical inactivity, public health professionals and community leaders can see the following web sites:

- <http://thecommunityguide.org>

Click on "publications" to find information on a Morbidity and Mortality Weekly Report (MMWR) describing population-based strategies to increase physical activity levels.

- <http://nurseweb.ucsf.edu/iha/pahi>

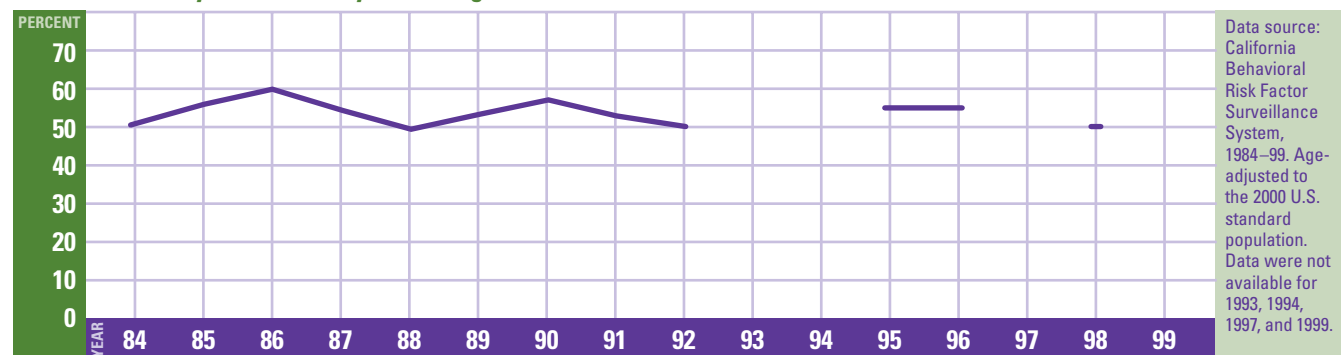
This web site provides information about the Physical Activity and Health Initiative (PAHI) sponsored by the California Department of Health Services and the University of California, San Francisco.

- <http://www.astphnd.org/programs/guidelines.htm>

This web site of the Association of State and Territorial Public Health Nutrition Directors contains a publication released in February 2002 called "Guidelines for Comprehensive Programs to Promote Healthy Eating and Physical Activity." These guidelines were developed by the Nutrition and Physical Activity Work Group, a consultative group to CDC, to assist organizations at the state and local levels in creating comprehensive nutrition, physical activity, and obesity control programs.

Physical Inactivity: California Surveillance Data

Prevalence of Physical Inactivity, Adults Aged 18 and Older, 1984–99

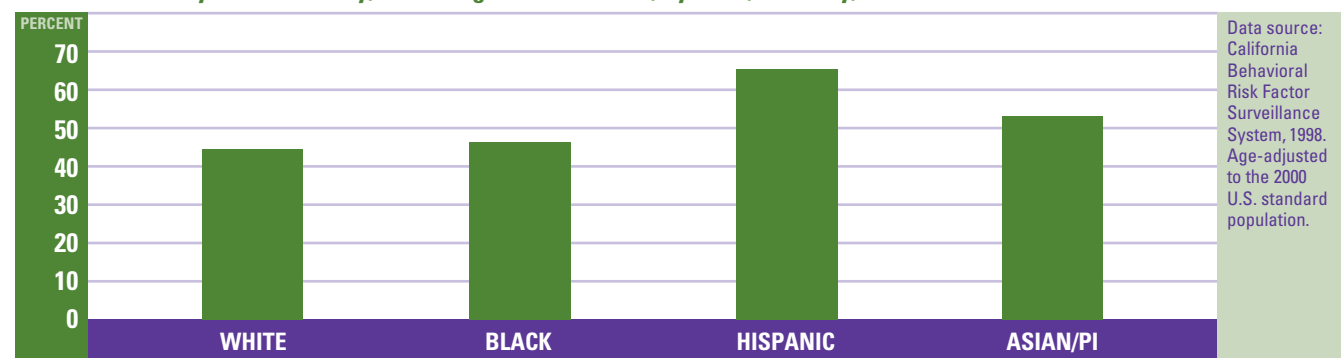


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Statewide prevalence of physical inactivity has remained relatively stable during the period of 1984 (50.8 percent) to 1998 (50.3 percent). Peak levels of physical inactivity were observed in 1986 with 59.3 percent of California adults reporting a more sedentary lifestyle. The lowest prevalence of physical inactivity was reported in 1988 (49.1 percent).

Since 1984, men and women have followed similar patterns of reported physical inactivity with men tending to be slightly more active than women. In 1998, there was a slightly higher prevalence of physical inactivity among women (50.9 percent) compared with men (49.5 percent). (Data not shown.)

Prevalence of Physical Inactivity, Adults Aged 18 and Older, by Race/Ethnicity, 1998



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

In 1998, Hispanics had the highest prevalence of physical inactivity (65.7 percent), followed by Asian/Pacific Islanders (52.4 percent) and blacks (47.8 percent). Whites had the lowest prevalence of physical inactivity with 45.5 percent of adults reporting a sedentary lifestyle.

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High Blood Pressure

High Blood Pressure: Background

High blood pressure, or hypertension, is common in the United States, and its prevalence increases with age. Only about four percent of Americans aged 18–24 have high blood pressure, whereas nearly 65 percent of Americans aged 80 and over have high blood pressure.¹ The cause of most hypertension is unknown.

As blood pressure increases, so does the risk of death from all causes and from cardiovascular disease in particular. Evidence shows that the risk of heart disease and stroke increases as blood pressure rises, even when blood pressure registers in the “normal” range. The likelihood of a cardiovascular event increases in a stepwise fashion as blood pressure moves from “optimal” to “normal” and “high-normal.” The risk of a cardiovascular event becomes even greater as people with “high-normal” blood pressure pass the age of 65.²

High blood pressure over a number of years causes pathological changes in blood vessels and organs such as the heart, kidneys, eyes, and brain. Blood vessel walls can be damaged directly from the pressure or by the accelerated development of atherosclerotic plaques.¹

The categories below were developed by the 1997 Joint Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

Classification of Blood Pressure for Adults Aged 18 Years and Older³

Category	Systolic (mm Hg)		Diastolic (mm Hg)
Optimal	<120	and	<80
Normal	<130	and	<85
High-normal	130–139	or	85–89
Hypertension			
Stage 1	140–159	or	90–99
Stage 2	160–179	or	100–109
Stage 3	≥180	or	≥110

Some additional facts about high blood pressure in the United States include:

- People with uncontrolled high blood pressure have three to four times the risk of developing heart disease and as much as seven times the risk of developing stroke as do those with normal blood pressure.⁴
- Even people with “high-normal” blood pressure are at increased risk. This group has 1.5 to 2.5 times greater risk of suffering a heart attack, stroke, or heart failure in ten years than those with optimal blood pressure.²
- Approximately 30 percent of American adults have high blood pressure (stage 1 and/or taking antihypertensive medication). Despite high levels of awareness and detection, only slightly more than one in five people with hypertension have their blood pressure under control.⁵
- Black men and women have the highest prevalence of hypertension, 34 percent and 31 percent, respectively.⁶
- Blacks and whites with hypertension are more likely to be aware and treated, or treated and controlled, than Hispanics.⁶

High Blood Pressure: Opportunities for Action

Most cases of high blood pressure can be prevented or treated by maintaining a healthy body weight, not smoking, exercising regularly, eating a low-sodium diet, and taking medication regularly when advised by a physician.

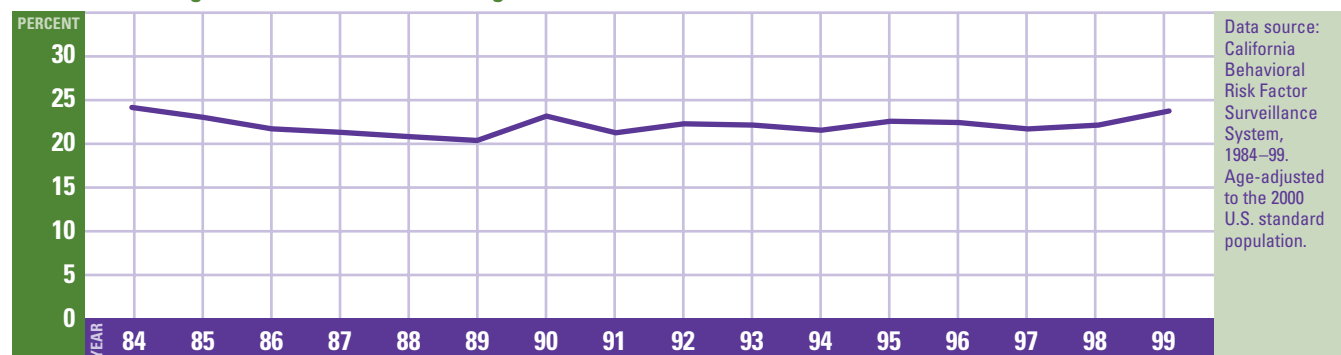
To reduce the risk of cardiovascular disease due to high blood pressure, public health professionals and community leaders can:

- Educate the public on the importance of knowing their own blood pressure and emphasizing the seriousness of hypertension and the lifestyles that prevent it.
- Train clinicians on appropriate treatment of patients with high blood pressure.
- Contact the National Heart, Lung, and Blood Institute for intervention ideas and tools. See the following web site: <http://www.nhlbi.nih.gov>
- Promote a general heart-healthy environment in the community. Interventions that increase physical activity, improve diet, and control weight will reduce the risk of heart disease in those with and without high blood pressure.
- See *The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* for programs aimed at the public and health professionals to reduce death and disability related to high blood pressure through appropriate prevention and treatment strategies.³



High Blood Pressure: California Surveillance Data

Prevalence of High Blood Pressure, Adults Aged 18 and Older, 1984–99

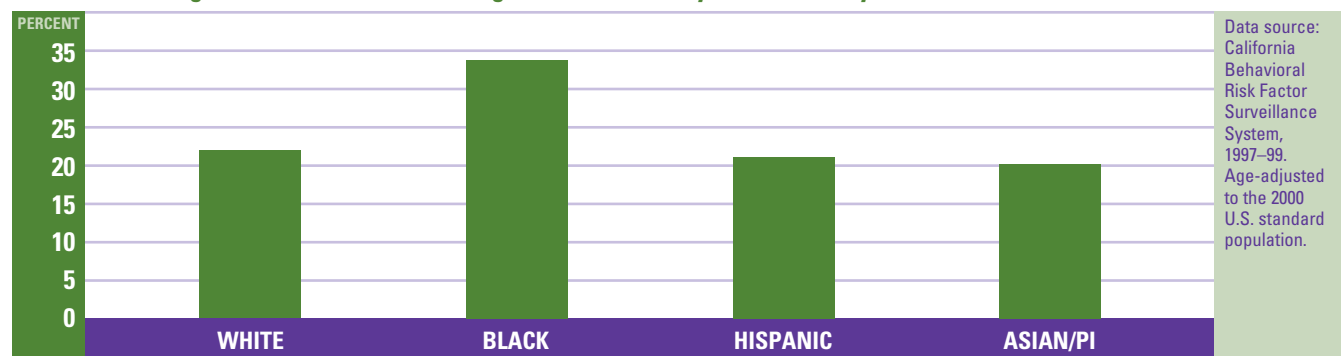


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The prevalence of California adults who reported having ever been told by a health professional that their blood pressure was high has remained relatively stable over time. In 1984, the prevalence of high blood pressure was 24.1 percent. Although this percentage decreased to 20.6 percent in 1989, it rose to 23.7 percent in 1999.

In 1999, a slightly higher prevalence of men (24.2 percent) compared with women (23.3 percent) reported having ever been told by a health professional that their blood pressure was high. (Data not shown.)

Prevalence of High Blood Pressure, Adults Aged 18 and Older, by Race/Ethnicity, 1997–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

The average prevalence (1997–99) of reported high blood pressure was highest among blacks (34.3 percent). Whites, Hispanics, and Asian/Pacific Islanders had similar prevalence estimates for reported high blood pressure (22.9 percent,

20.9 percent, and 20.2 percent, respectively); however, all three groups had substantially lower percentages of high blood pressure than that of blacks.

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High Blood Cholesterol

High Blood Cholesterol: Background

The risk of cardiovascular disease increases as the level of serum cholesterol increases.¹ High blood cholesterol, or hypercholesterolemia, are terms used to describe levels of serum cholesterol that are associated with an increased risk of atherosclerosis and cardiovascular disease.¹

When cholesterol levels in the blood stream are high, cholesterol is deposited in blood vessel walls, a condition called atherosclerosis. These deposits form plaques that inhibit blood flow or even rupture the blood vessels, causing acute cardiovascular events or death. When blood flow to the heart is impeded, this can result in angina pectoris or myocardial infarction. When blood vessels in the brain rupture or their blood flow is stopped, this results in stroke.¹

People at highest risk (known atherosclerosis, family history of premature coronary heart disease or cholesterol disorder, or people with multiple risk factors) are recommended to have a full lipoprotein analysis. Low density lipoprotein (LDL) levels provide a better measure of risk for coronary heart disease than do total cholesterol levels.¹

The table below describes lipoprotein levels that are associated with increased risk of heart disease and stroke.

The National Cholesterol Education Program ATP III Classification of LDL, Total, and HDL Cholesterol (mg/dL):²

LDL (low density lipoprotein) Cholesterol— Primary Target of Therapy

Level	Category
<100	Optimal
100–129	Near optimal/above optimal
130–159	Borderline high
160–189	High
≥190	Very high

Total Cholesterol

Level	Category
<200	Desirable
200–239	Borderline high
≥240	High

HDL (high density lipoprotein) Cholesterol

Level	Category
<40	Low
≥60	High

Some facts about high blood cholesterol in the United States include:

- High blood cholesterol is thought to account for approximately 30 percent of coronary heart disease and up to 20 percent of strokes in the United States.¹
- Thirty-one percent of U.S. adults have borderline high cholesterol levels, and 20 percent have high levels.¹
- The mean U.S. blood cholesterol level is 205 mg/dL, which is above the desirable level of 200 mg/dL.³

High Blood Cholesterol: Opportunities for Action

High blood cholesterol can be prevented or treated through physical activity, not smoking, and a diet low in fat, saturated fat, and cholesterol. For patients who have hypercholesterolemia that does not respond to diet, medication therapy is recommended.

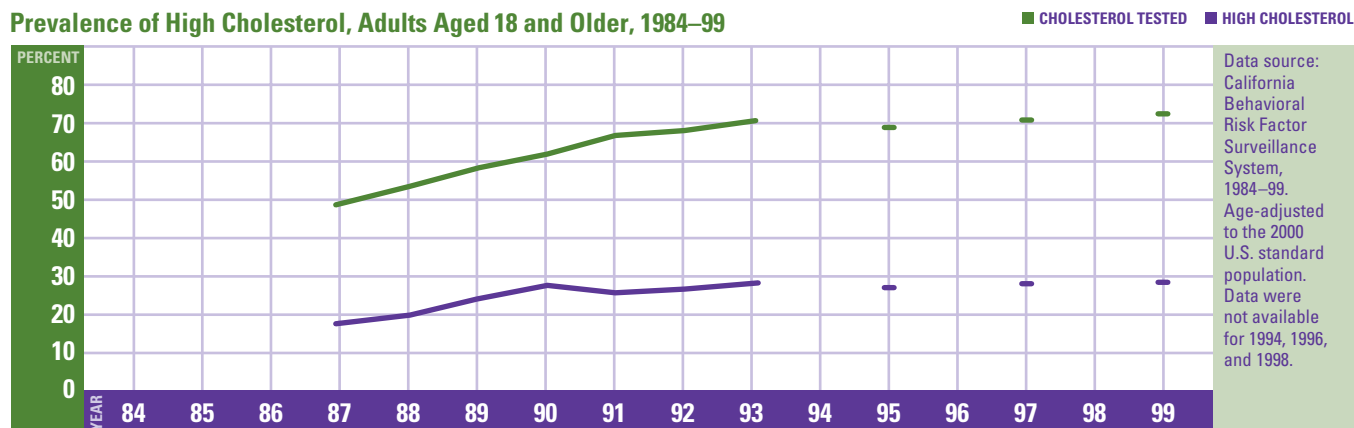
To reduce the risk of cardiovascular disease due to high blood cholesterol, public health professionals and community leaders can:

- Educate the public on the importance of knowing their cholesterol levels and preventing and treating high blood cholesterol through appropriate diet, exercise, and not smoking.
- Educate clinicians on appropriate guidelines for cholesterol management. See *Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)* developed by the National Cholesterol Education Program at the National Heart, Lung, and Blood Institute (NHLBI).²
- See the web site for NHLBI at: <http://www.nhlbi.nih.gov>



High Blood Cholesterol: California Surveillance Data

Prevalence of High Cholesterol, Adults Aged 18 and Older, 1984–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

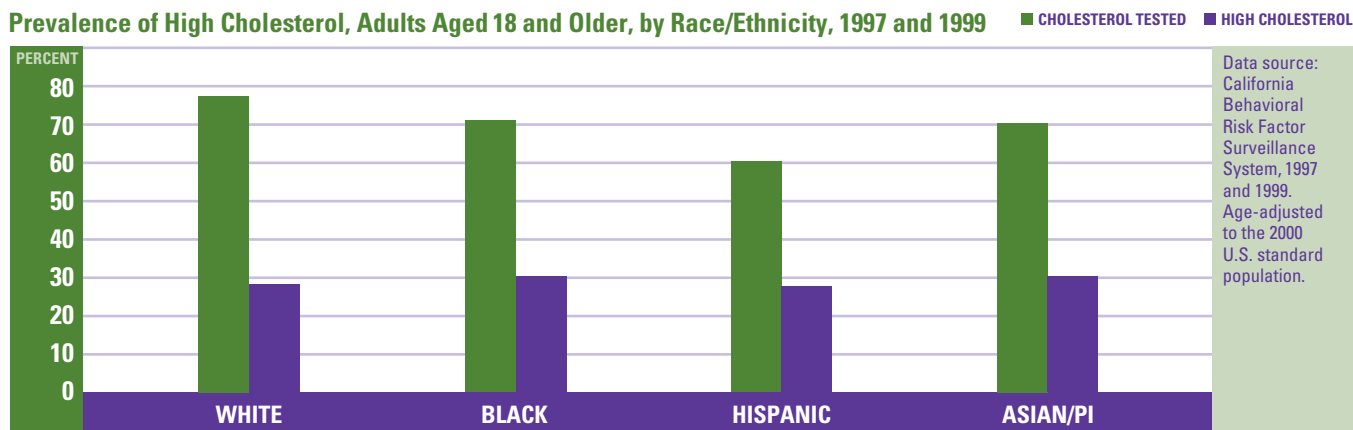
In order to assess the prevalence of high blood cholesterol, two questions were asked of the survey participants. The first question asked participants if they had ever had their blood cholesterol measured. Among those who reported having their blood cholesterol measured, a second question inquired as to whether or not they had ever been told by a health professional that their blood cholesterol was high.

The percentage of California adults who reported having ever had their blood cholesterol measured increased from 49.6 percent in 1987 to 71.5 percent in 1999. The prevalence of adults who had their blood cholesterol checked and reported having

been told by a health professional that their blood cholesterol was high has also increased over time. In 1987, 17.7 percent of those who had their blood cholesterol checked reported having been told they had high cholesterol. This figure increased to 27.5 percent by 1999.

In 1999, a lower percentage of men reported having had their blood cholesterol checked (69.6 percent) compared with women (73.6 percent). However, of those who had their blood cholesterol level tested, a higher percentage of men reported being told by a health professional that they had high cholesterol (28.7 percent) compared with women (26.2 percent). (Data not shown.)

Prevalence of High Cholesterol, Adults Aged 18 and Older, by Race/Ethnicity, 1997 and 1999



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Whites had the highest average prevalence (1997 and 1999) of adults that reported ever having had their blood cholesterol checked (76.8 percent). Blacks and Asian/Pacific Islanders had similar percentages of reported blood cholesterol screening (71.5 percent and 71.2 percent, respectively). The lowest prevalence of blood cholesterol testing was observed in Hispanics (59.8 percent).

The average prevalence (1997 and 1999) of high blood cholesterol among those that had their cholesterol tested was quite similar across all four race/ethnic groups. Blacks had the highest prevalence of high blood cholesterol (29.1 percent) followed closely by Asian/Pacific Islanders (29.0 percent). A slightly lower percentage of whites (27.7 percent) and Hispanics (27.0 percent) reported having ever been told they had high blood cholesterol levels.

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Hospitalization Surveillance Data and Disease Management



The previous section focused on health behaviors contributing to heart disease and stroke and presented epidemiological data for these risk factors. The first part of this section includes hospitalization rates and hospitalization costs due to heart disease and stroke in California. Data were acquired from the Office of Statewide Health Planning and Development and were age-adjusted to the 2000 U.S. standard population (see Appendix 1 for more information). The second part of this section describes activities that prevent death and disability in people who have symptomatic disease, and some quality indicators of medical care performance.

Hospitalization Surveillance Data

Hospitalizations for Heart Disease and Stroke, California, 1999

Discharged	Heart Disease	Stroke
Total*	187,714	96,208
Males	111,768	43,843
Females	75,941	52,363
Age Group (years)		
0–44	4.2%	4.2%
45–64	34.2%	20.3%
65–84	52.9%	58.6%
85+	8.7%	16.9%
Race/Ethnicity**		
White	70.3%	68.3%
Black	6.6%	8.1%
Hispanic	13.4%	13.6%
Asian/Pacific Islander	6.4%	7.6%
Total Charges	\$6.0 billion	\$2.1 billion
Total Hospital Days	852,954	810,214
Average length of stay	5 days	8 days
Average charge per day	\$7,054	\$2,555

Data source: Office of Statewide Health Planning and Development.

*Total includes 7 of unknown/other/missing sex, 5 in heart disease and 2 in stroke.

**Does not include Native American/Eskimo/Aleut, other, and unknown categories.

These categories comprised 3.4% of heart disease hospitalizations and 2.4% of stroke hospitalizations.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Based on the principal diagnosis, heart disease and stroke accounted for nearly 300,000 hospitalizations in 1999. Two-thirds of these hospitalizations were due to heart disease. There were more men than women hospitalized with a diagnosis of heart disease, accounting for 60 percent of the total. Hospitalizations for stroke were distributed more evenly between men and women, with women accounting for 54 percent of the total.

The majority of those hospitalized for heart disease and stroke were over the age of 65, 62 percent and 76 percent, respectively. Among the various race/ethnic groups, whites accounted for approximately 70 percent of the hospitalizations for both heart disease and stroke.

Hospitalizations for heart disease and stroke cost 8.1 billion dollars in 1999. Seventy-four percent of this cost was due to heart disease. On average, the length of a hospital stay was shorter for heart disease than stroke. However, the average charge per day for heart disease hospitalizations was nearly three times the charge for stroke hospitalizations.

Heart Disease Hospitalization Rates, California, 1999

	Heart Disease Discharges	Hospitalization Rates (per 1,000)	
		Crude Rate	Age-adjusted Rate*
Total	187,714	5.5	6.3
Age			
0–44	7,910	0.34	—
45–64	64,155	9.25	—
65–84	99,305	30.86	—
85+	16,344	38.10	—
Sex			
Male	111,768	6.5	8.4
Female	75,941	4.5	4.6
Race/Ethnicity			
White	131,891	7.6	6.6
Black	12,371	5.3	7.4
Hispanic	25,177	2.4	5.3
Asian/Pacific Islander	11,951	3.1	4.1

Data source: Office of Statewide Health Planning and Development.

*Age-adjusted to the 2000 U.S. standard population

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

In 1999, the age-adjusted hospitalization rate for heart disease in California was 6.3 per 1,000. The hospitalization rates increase with age, especially in the older age groups. Between age groups 45–64 and 65–84, hospitalization rates for heart disease more than triple. Men were hospitalized for heart disease almost 1.8 times (80 percent) more often than women. Among the race/ethnic groups, blacks had the highest age-adjusted hospitalization rate at 7.4 per 1,000. Whites and Hispanics had the next highest age-adjusted hospitalization rates at 6.6 per 1,000 and 5.3 per 1,000, respectively. Blacks were hospitalized 1.8 times (80 percent) more often than Asian/Pacific Islanders, who had the lowest age-adjusted hospitalization rate for heart disease (4.1 per 1,000).

Stroke Hospitalization Rates, California, 1999

	Stroke Discharges	Hospitalization Rates (per 1,000)	
		Crude Rate	Age-adjusted Rate*
Total	96,208	2.8	3.3
Age			
0–44	4,069	0.2	—
45–64	19,538	2.8	—
65–84	56,369	17.5	—
85+	16,232	37.8	—
Sex			
Male	43,843	2.6	3.5
Female	52,363	3.1	3.1
Race/Ethnicity			
White	65,675	3.8	3.2
Black	7,835	3.4	5.0
Hispanic	13,043	1.3	2.8
Asian/Pacific Islander	7,302	1.9	2.6

Data source: Office of Statewide Health Planning and Development.

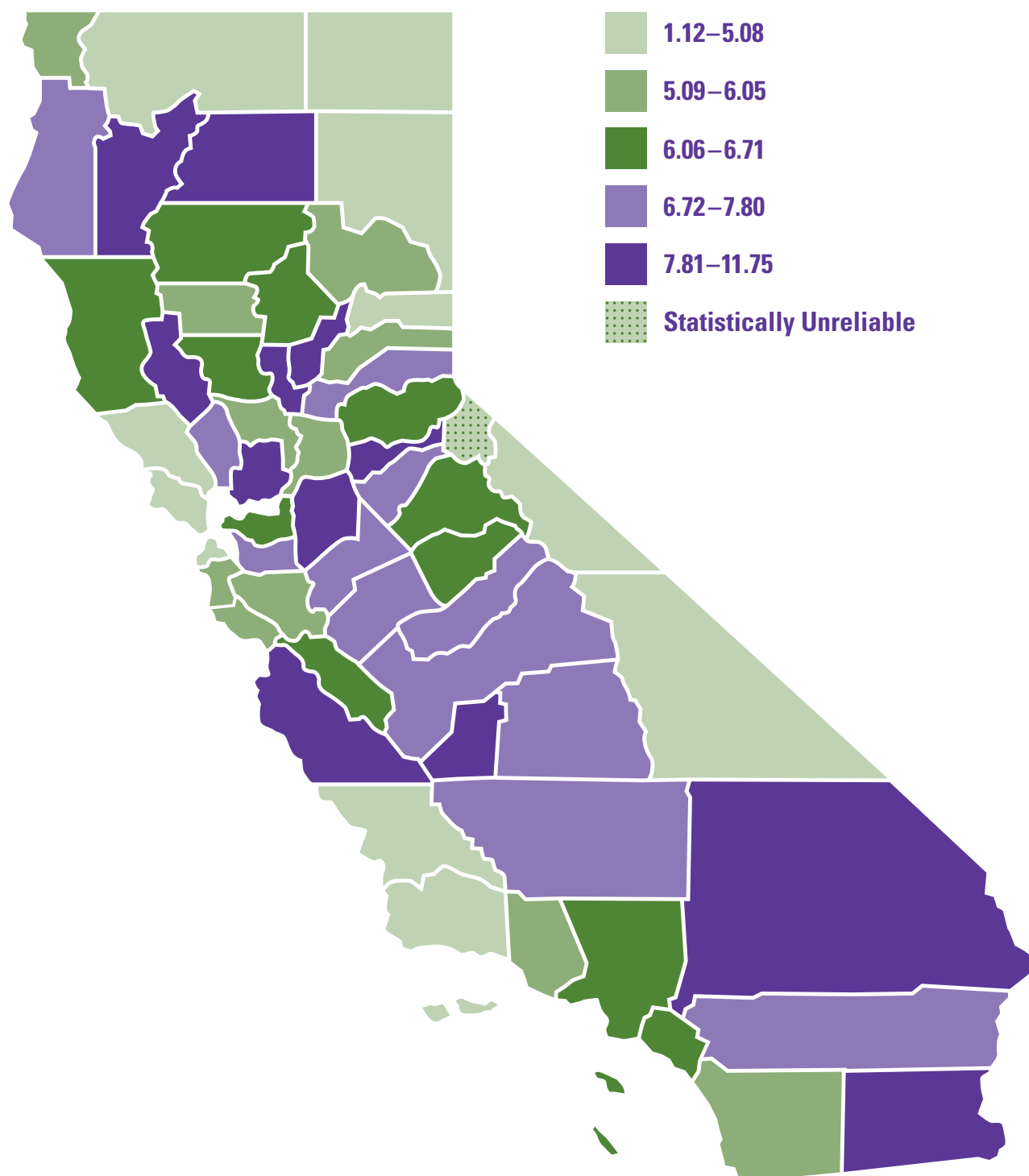
*Age-adjusted to the 2000 U.S. standard population

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

In 1999, the age-adjusted hospitalization rate for stroke in California was 3.3 per 1,000. Hospitalization rates for stroke increased with age and were highest in the 85 and older age group. Hospitalization rates for heart disease were higher than for stroke in all age groups. Hospitalization rates for stroke varied by sex and race/ethnicity. According to the age-adjusted rates for stroke, men were hospitalized more than women but by a narrower margin than for heart disease hospitalizations. Similar to heart disease hospitalization rates, blacks had the highest age-adjusted hospitalization rate for stroke (5.0 per 1,000). Whites had the next highest rate at 3.2 per 1,000. Hispanics and Asian/Pacific Islanders had the lowest rates for stroke hospitalization (2.8 per 1,000 and 2.6 per 1,000, respectively).

Age-Adjusted Heart Disease Hospitalization Rates*

1997–99



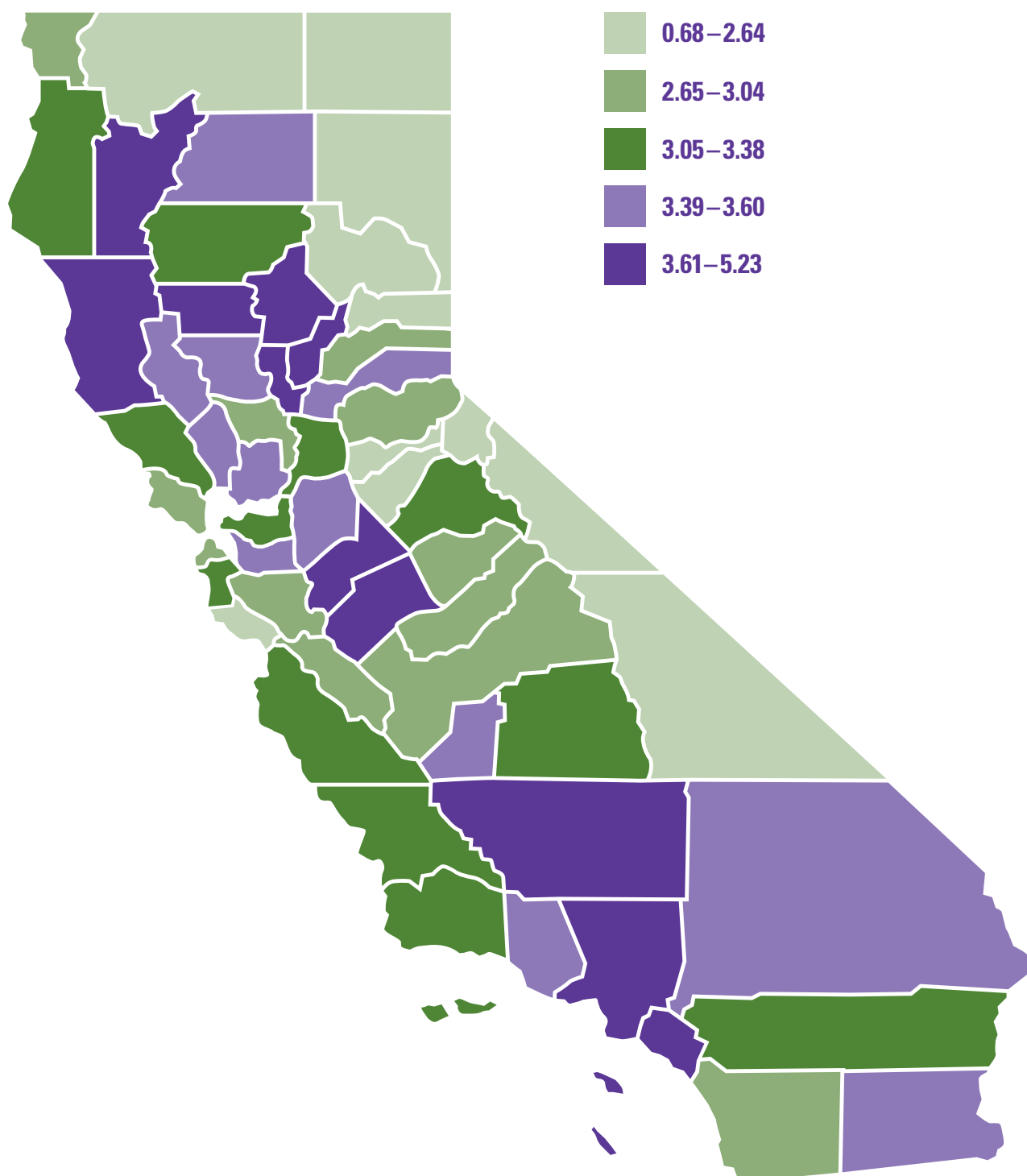
Data source: Office of Statewide Health Planning and Development.

*Rates per 1,000 population. Age-adjusted to the 2000 U.S. standard population.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Age-Adjusted Stroke Hospitalization Rates*

1997–99



Data source: Office of Statewide Health Planning and Development.

*Rates per 1,000 population. Age-adjusted to the 2000 U.S. standard population.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Heart Disease Hospitalization Rates by County, 1997–99

Rank Order	County	Age-Adjusted Hospitalization Rate* (per 1,000)
1	LAKE	11.75
2	YUBA	11.72
3	SUTTER	9.26
4	KINGS	9.14
5	TRINITY	8.68
6	SOLANO	8.52
7	SAN BERNARDINO	8.35
8	MONTEREY	8.31
9	AMADOR	8.27
10	SAN JOAQUIN	8.03
11	IMPERIAL	7.99
12	SHASTA	7.86
13	KERN	7.75
14	TULARE	7.65
15	RIVERSIDE	7.60
16	CALAVERAS	7.34
17	PLACER	7.29
18	NAPA	7.14
19	STANISLAUS	7.13
20	MADERA	7.01
21	HUMBOLDT	6.99
22	MERCED	6.96
23	FRESNO	6.87
24	ALAMEDA	6.73
25	TUOLUMNE	6.70
26	TEHAMA	6.66
27	LOS ANGELES	6.52
28	MARIPOSA	6.49
29	COLUSA	6.48
	CALIFORNIA	6.48
30	MENDOCINO	6.46
31	BUTTE	6.45
32	EL DORADO	6.31
33	ORANGE	6.26
34	SAN BENITO	6.20
35	CONTRA COSTA	6.10
36	GLENN	6.00
37	SACRAMENTO	5.98
38	SAN DIEGO	5.97
39	SANTA CLARA	5.96
40	VENTURA	5.69
41	YOLO	5.60
42	SANTA CRUZ	5.56
43	DEL NORTE	5.43
44	NEVADA	5.33
45	PLUMAS	5.22
46	SAN MATEO	5.19
47	SAN LUIS OBISPO	4.98
48	SAN FRANCISCO	4.96
49	SISKIYOU	4.89
50	SONOMA	4.85
51	SANTA BARBARA	4.68
52	MARIN	4.63
53	INYO	3.76
54	MODOC	3.45
55	SIERRA	3.32
56	LASSEN	2.96
57	ALPINE	**1.73
58	MONO	1.12

Data source: Office of Statewide Health Planning and Development.

*Age-adjusted to the 2000 U.S. standard population.

**Statistically unreliable.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Stroke Hospitalization Rates by County, 1997–99

Rank Order	County	Age-Adjusted Hospitalization Rate* (per 1,000)
1	YUBA	5.23
2	SUTTER	4.30
3	TRINITY	4.23
4	STANISLAUS	3.87
5	GLENN	3.83
6	KERN	3.77
7	MERCED	3.71
8	BUTTE	3.71
9	MENDOCINO	3.68
10	LOS ANGELES	3.65
11	ORANGE	3.61
12	SHASTA	3.59
13	VENTURA	3.52
14	SOLANO	3.50
15	NAPA	3.50
16	PLACER	3.50
17	LAKE	3.49
18	SAN BERNARDINO	3.47
19	SAN JOAQUIN	3.47
20	KINGS	3.46
21	ALAMEDA	3.44
22	IMPERIAL	3.40
23	COLUSA	3.40
24	TULARE	3.36
	CALIFORNIA	3.36
25	SANTA BARBARA	3.36
26	RIVERSIDE	3.35
27	TUOLUMNE	3.32
28	HUMBOLDT	3.27
29	SONOMA	3.26
30	CONTRA COSTA	3.24
31	SACRAMENTO	3.20
32	SAN LUIS OBISPO	3.18
33	MONTEREY	3.15
34	SAN MATEO	3.05
35	TEHAMA	3.05
36	SAN DIEGO	3.04
37	MARIPOSA	3.04
38	SAN FRANCISCO	3.02
39	FRESNO	3.02
40	NEVADA	2.95
41	MARIN	2.91
42	SANTA CLARA	2.88
43	YOLO	2.86
44	EL DORADO	2.85
45	DEL NORTE	2.82
46	MADERA	2.71
47	SAN BENITO	2.65
48	SANTA CRUZ	2.63
49	AMADOR	2.51
50	CALAVERAS	2.45
51	SISKIYOU	2.33
52	PLUMAS	2.27
53	MODOC	1.57
54	INYO	1.54
55	SIERRA	1.48
56	LASSEN	1.21
57	MONO	0.81
58	ALPINE	0.68

Data source: Office of Statewide Health Planning and Development.

*Age-adjusted to the 2000 U.S. standard population.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Clinical Treatment and Disease Management

When someone has cardiovascular disease, the goal is to prevent the progression of disease or its complications, and to provide rehabilitation. Medical care followed by cardiac rehabilitation after an acute myocardial infarction is an example of this. Traditionally, public health programs have focused on prevention of disease; however, medical treatment and disease management have become an increasing priority of sound public health programs due to growing concerns regarding quality of care, quality of life, the cost of long-term care, and the aging population's demand for health care.

According to a set of important quality indicators, medical management of disease in California has some room for improvement. Only 84 percent of those suffering a myocardial infarction are prescribed aspirin at discharge. Only 62 percent of those hospitalized with heart failure have an evaluation of ejection fraction. Of those hospitalized for atrial fibrillation, stroke, or transient ischemic attack, only 44 percent receive warfarin at discharge. For more information, see the report from the Centers for Medicare and Medicaid Services (CMS), formerly the Health Care Financing Administration (HCFA), published in the *Journal of the American Medical Association* in 2000.¹

Strategies for Improvement

A comprehensive approach to minimizing disability and death from heart disease and stroke should include interventions that enhance the early recognition and treatment of symptoms, as well as the prevention of disease recurrence and progression.

1. Promote early recognition and treatment of symptoms

In 1996, the American College of Cardiology (ACC) and the American Heart Association (AHA) estimated that 900,000 people each year experience myocardial infarction in the United States. Of those, about 225,000 die, including 125,000 who die before

receiving any medical care. Recognition of symptoms of angina or myocardial infarction is particularly challenging in women, who may not experience classic symptoms. The public must be educated on how to recognize signs of myocardial infarction and the importance of prompt treatment, and the community emergency medical system must be trained in providing prompt, appropriate care.^{2,3}

Stroke symptoms in both men and women are also often not recognized, and seeking medical care is often delayed so long that treatment is ineffective. Effective emergency transport services may be lacking in some regions. Also, not all emergency centers and hospitals implement acute care and long-term treatment protocols. According to the AHA, prompt treatment with thrombolytic therapy improves the outcome after ischemic stroke when given within three hours of the onset of stroke in carefully selected patients. This treatment can have long-term benefits for persons with a wide spectrum of neurological deficits.⁴

Opportunities for Action

- Promote public education regarding the signs and symptoms of heart attack and stroke.
- Find and overcome obstacles to effective emergency transport to early treatment.
- Refer to the web sites listed in the "Resources" section at the end of this report for further information.

2. Promote optimal treatment that prevents recurrence of heart attack and stroke

A broad base of scientific evidence supports the AHA/ACC guidelines for prevention of recurrent cardiac events in people with known heart disease. These guidelines recommend specific medications (aspirin, statins, angiotensin converting enzyme (ACE) inhibitors, beta-blockers) and lifestyle modifications (exercise, proper nutrition, smoking cessation).⁵

Unfortunately, as stated previously, these guidelines are inadequately implemented.¹ According to the guidelines, risk reduction for heart disease patients should include:^{5,6,7}

- Smoking cessation
- Lipid management (LDL<100 mg/dL)
- Physical activity (minimum of 30 minutes, 3 to 4 days a week)
- Weight management
- Blood pressure control (<140/90 mm Hg, or <130/85 mm Hg if patient has heart failure or renal insufficiency, or <130/80 mm Hg if patient has diabetes)
- Anti-platelet agents/anticoagulants unless contraindicated
- ACE inhibitors for patients post-myocardial infarction
- Beta-blockers for patients post-myocardial infarction
- Glucose management for people with diabetes (Hemoglobin A1C <7 percent)

Earlier guidelines recommended hormone replacement therapy (HRT) in postmenopausal women to reduce heart disease risk. Recent clinical trials, however, indicate that the type of HRT that uses both estrogen and progestin (combined HRT) does not reduce heart disease risk and may even increase the risk of heart attack and stroke. Based on current evidence, the American Heart Association advises women not to start or continue combined HRT for the prevention of coronary heart disease.

An ongoing clinical trial to be completed in 2005 will show whether estrogen alone (which is prescribed for women who have had a hysterectomy) benefits their heart disease risk.

Prevention of first stroke should include control of high blood pressure; use of warfarin in patients after a heart attack who have atrial fibrillation or other specific heart conditions; use of statins (cholesterol lowering drugs); and performing carotid endarterectomy for patients with carotid stenosis.⁹ Prevention of recurrent stroke is similar although there are no official secondary prevention guidelines. The AHA is developing stroke prevention guidelines for hospitals. Check the AHA web site for updates on these guidelines (<http://www.americanheart.org>).

Opportunities for Action

- Promote professional education about implementation of quality care guidelines for acute and chronic treatment by the health care services sector. The ACC (<http://www.acc.org>), the AHA (<http://www.americanheart.org>), the American Stroke Association (<http://www.strokeassociation.org>), and the Agency for Healthcare Research and Quality (<http://www.ahrq.gov>) offer scientific information and guidelines. The National Stroke Association (<http://www.stroke.org>) provides up-to-date stroke information and education to all specialties of stroke professionals, including physicians, nurses, therapists, dietitians, residents, and interns.
- Promote healthcare systems change to implement quality care guidelines (see above).
- Build community support, including self-management models, for compliance with medications and medical therapies.
- Promote quality rehabilitation services.
- Refer to the web sites listed in the “Resources” section at the end of this report for further information.

References

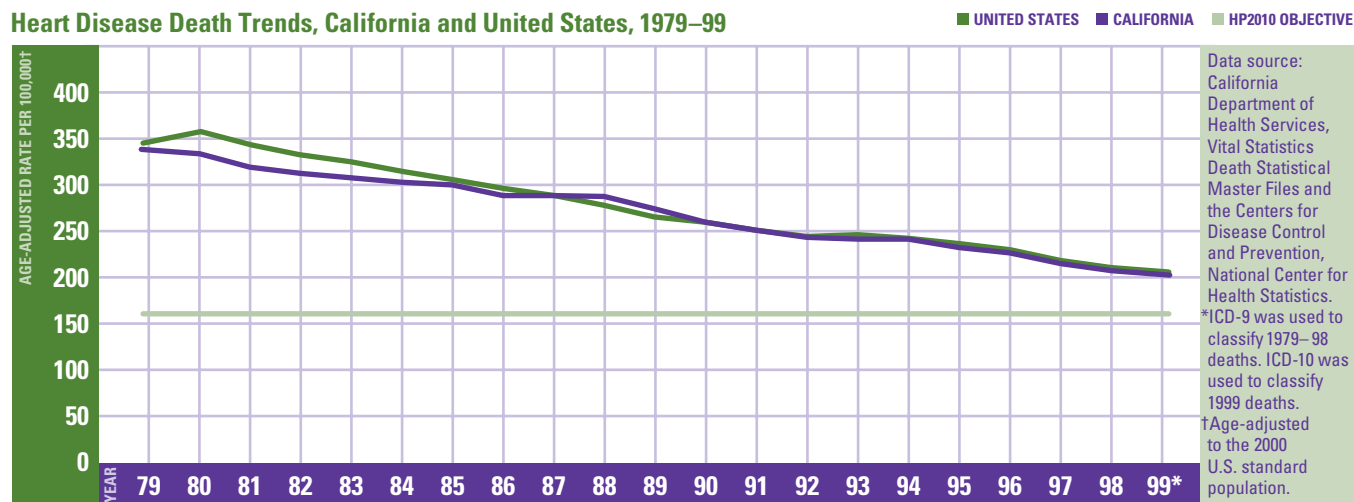
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Mortality Surveillance Data



This section focuses on the impact of heart disease and stroke on mortality in California. In 1999, there were 58,476 deaths due to heart disease and 18,079 deaths due to stroke in California. Statewide heart disease and stroke death trends are presented (1979–99). Death trends are also presented by sex (1979–99) and by race/ethnicity (1985–99). Maps depict rank ordering of county death rates from heart disease and stroke (1996–98). All data are from California Vital Statistics and are age-adjusted to the 2000 U.S. standard population. For additional information regarding these analyses, please refer to Appendix 1.

Heart Disease Death Trends, California and United States, 1979–99

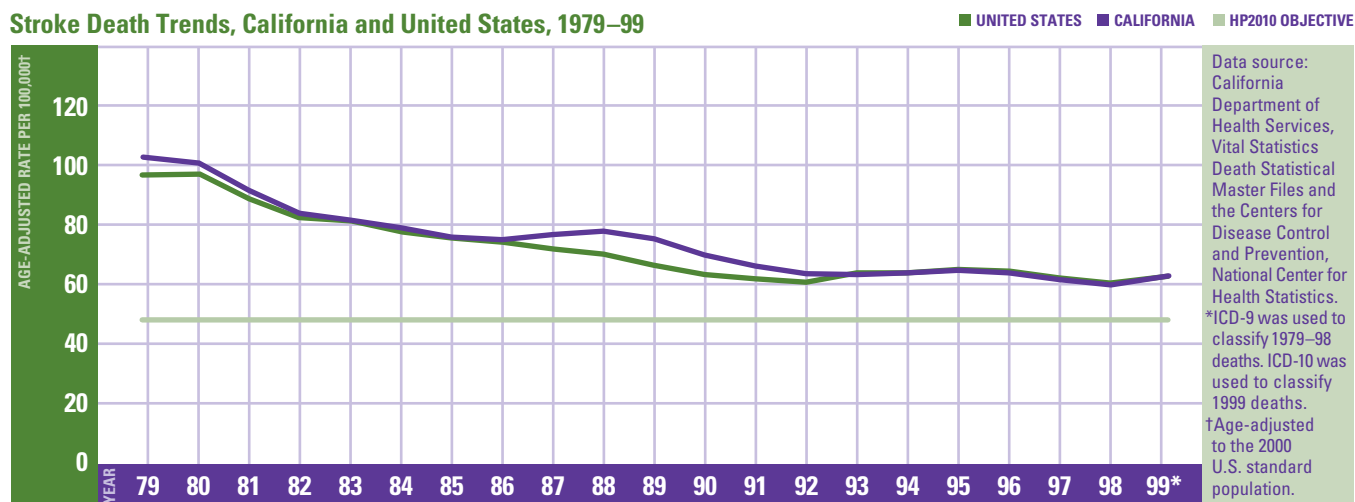


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

During the period of 1979–99, both California and the United States experienced an overall decrease in age-adjusted death rates due to heart disease. In 1979, the age-adjusted heart disease death rate (337.0 per 100,000 population) was lower than that of the United States (350.4 per 100,000 population). California's heart disease death rate (285.5 per 100,000) surpassed that of the nation (283.5 per 100,000) in 1987. Since then, these two rates have fluctuated back and forth. In 1999, heart disease death rates for both California and the United States were approximately 204 deaths per 100,000 population.

Healthy People 2010 is a set of health objectives for the nation intended to guide the development of programs to improve health. These objectives establish benchmarks by which states can measure their progress. One of the key objectives for heart disease addresses the need to decrease heart disease deaths.¹ Based upon 1999 data, California's overall age-adjusted heart disease death rate will need to decline by 18.6 percent to reach the Healthy People 2010 objective of 166 deaths per 100,000 population by the year 2010 (Objective 12.1).

Stroke Death Trends, California and United States, 1979–99

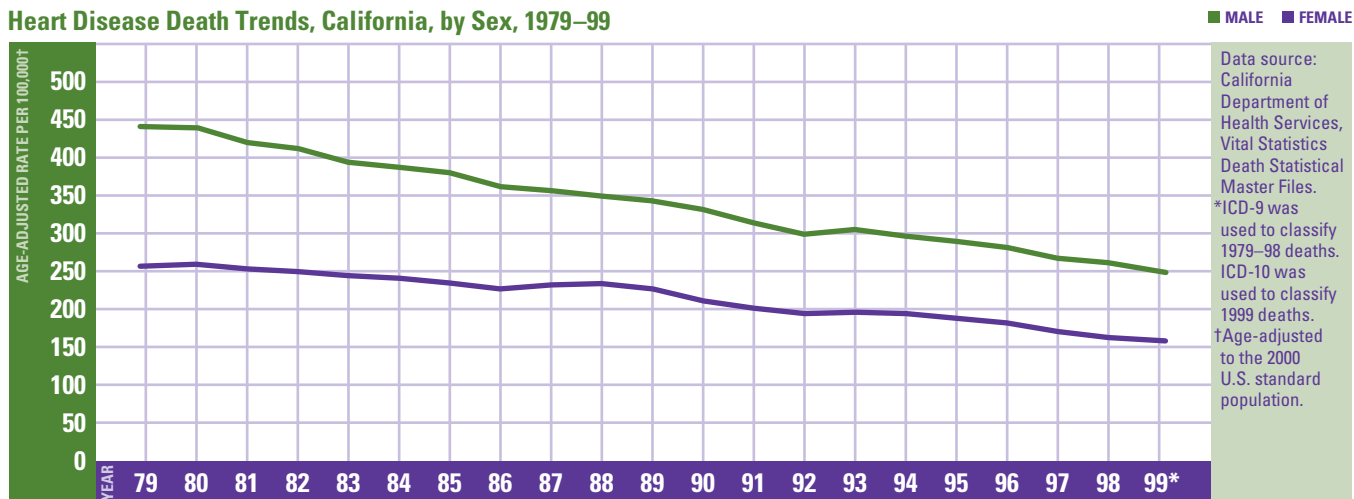


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

As with heart disease, age-adjusted rates of death due to stroke have also decreased over time for both California and the nation. In 1979, the age-adjusted stroke death rate was 101.0 per 100,000 population in California compared with 97.3 per 100,000 population in the United States. In 1999, California's age-adjusted stroke death rate was 63.3 deaths per 100,000 population compared with 61.6 deaths per 100,000 population in the United States.

Not only is there much to accomplish to reach the Healthy People 2010 objective for heart disease deaths, there is also much to accomplish in order to meet the Healthy People 2010 objective for stroke deaths.¹ According to 1999 data, the overall age-adjusted stroke death rate for California will need to decrease by 24.2 percent to reach the Healthy People 2010 objective of 48 deaths per 100,000 population by the year 2010 (Objective 12–7).

Heart Disease Death Trends, California, by Sex, 1979–99

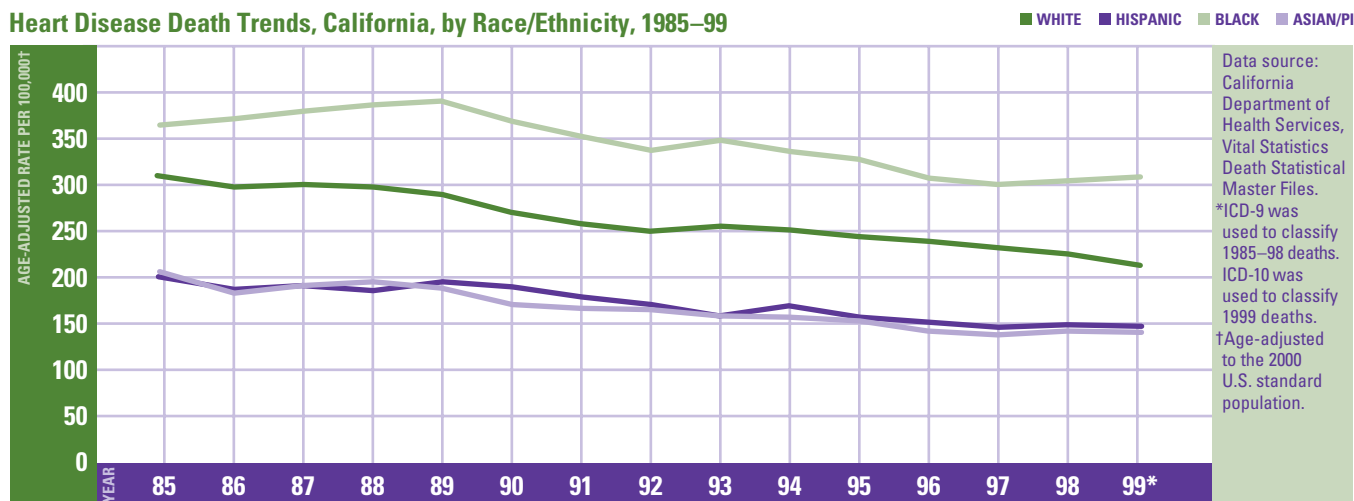


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Age-adjusted death rates due to heart disease declined during the period of 1979–99 for both men and women. In general, men have a higher rate of death due to heart disease than women. However, the gap between the two sex-specific rates has been narrowing over time. Compared with women, men have undergone a more

dramatic decrease in heart disease death rates, with rates falling from 442.3 deaths per 100,000 population in 1979 to 250.4 deaths per 100,000 population in 1999. Women experienced a smaller decline, from 259.6 deaths per 100,000 population in 1979 to 167.7 deaths per 100,000 population in 1999.

Heart Disease Death Trends, California, by Race/Ethnicity, 1985–99

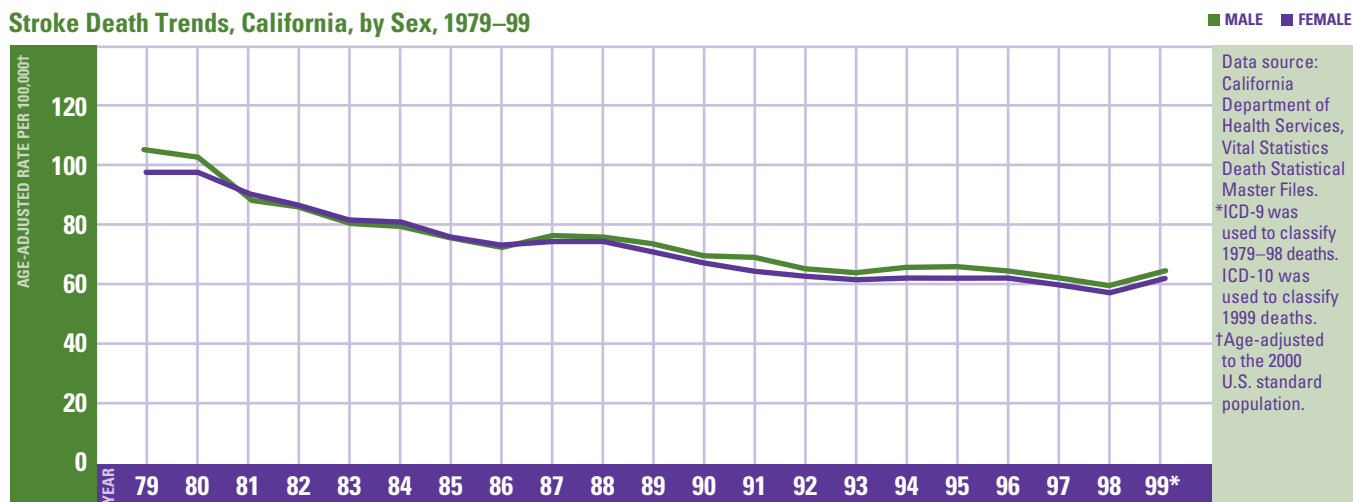


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Age-adjusted death rates due to heart disease have consistently been highest among blacks. Asian/Pacific Islanders tend to have the lowest rates of death due to heart disease. Although all groups have experienced a decrease in heart disease death rates during 1985–99, the magnitude of decline for each group differs.

Whites have undergone the greatest decrease in heart disease death rates with 311.8 per 100,000 in 1985 compared with 218.7 per 100,000 in 1999. Declines in heart disease death rates for blacks, Hispanics, and Asian/Pacific Islanders were not as pronounced as that for whites.

Stroke Death Trends, California, by Sex, 1979–99

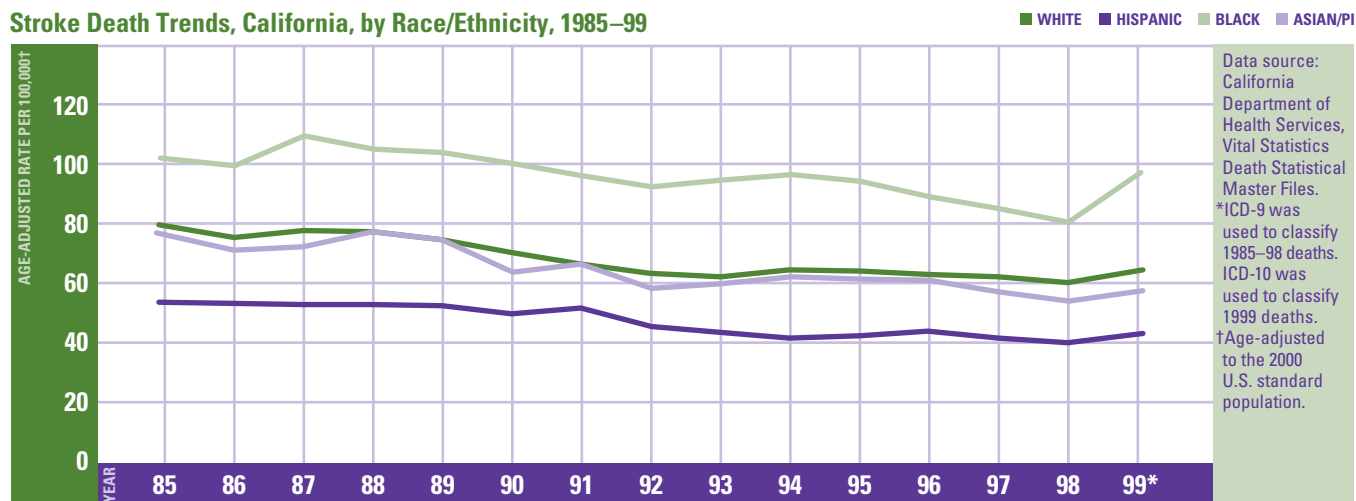


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Overall, rates of death due to stroke have decreased during 1979–99 for both men and women. Death rates for both sexes have followed a similar pattern of decline, with women typically having a slightly lower death rate from

stroke compared with men. In 1999, the death rate due to stroke for women was 61.5 per 100,000 population compared with 64.7 per 100,000 population for men.

Stroke Death Trends, California, by Race/Ethnicity, 1985–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

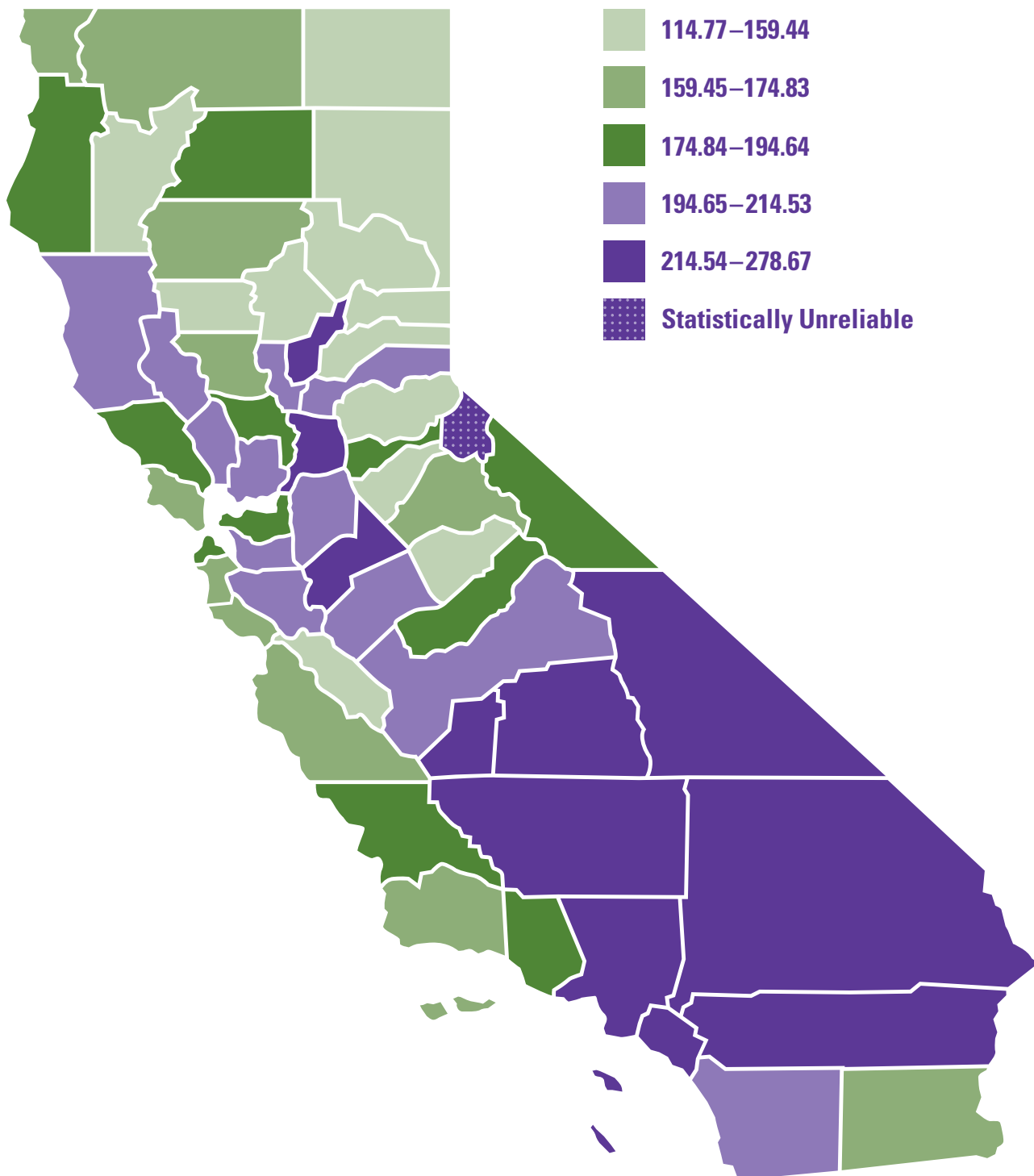
As with heart disease, age-adjusted death rates due to stroke have been highest among blacks. Hispanics have had the lowest stroke death rates as well as the least amount of change in age-adjusted rates of stroke death. Overall, all four race/ethnic groups have experienced a decrease in stroke death rates since 1985.

References

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Age-Adjusted Heart Disease Mortality Rates*

1996 – 98



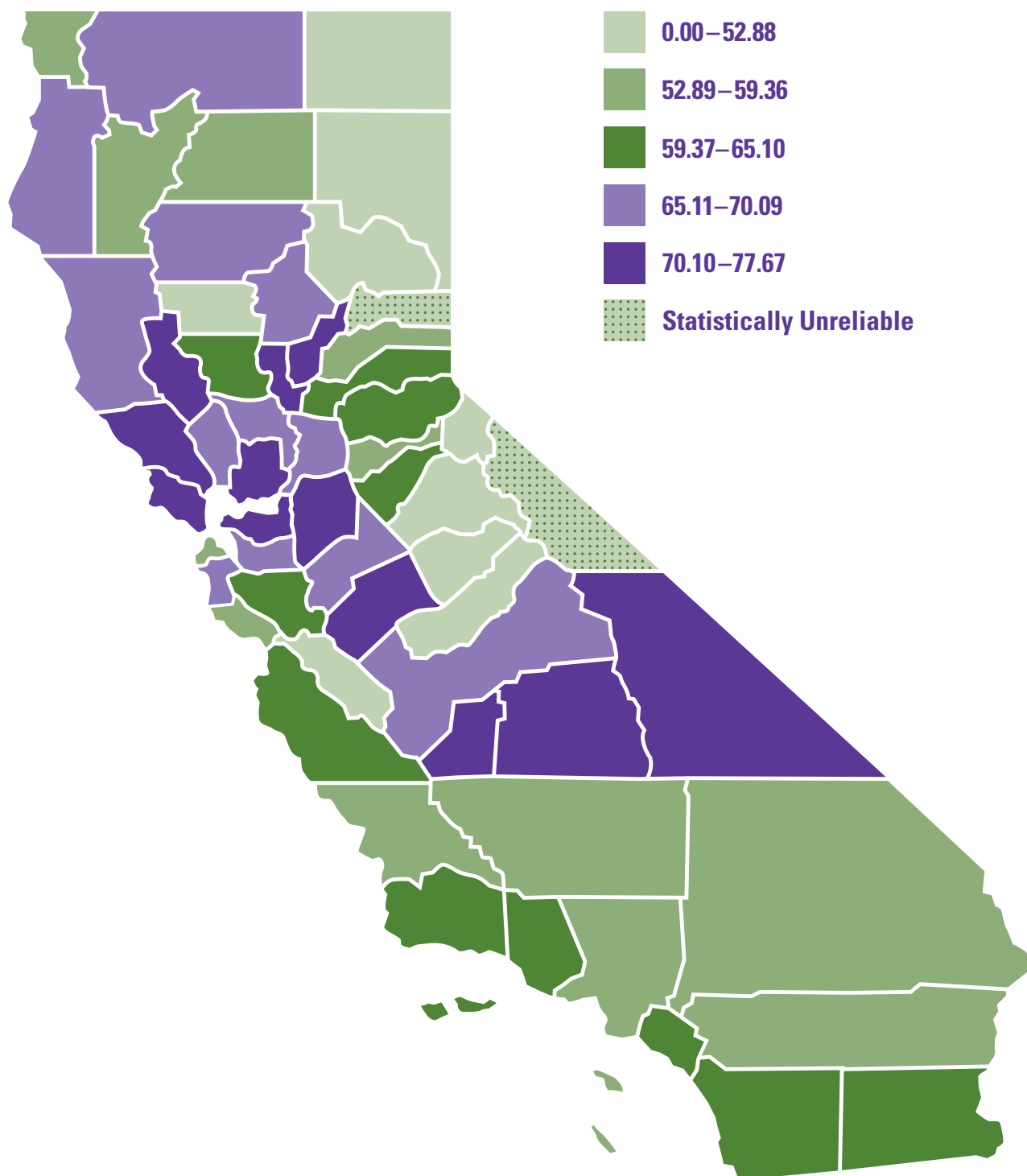
Data source: California Department of Health Services, Vital Statistics Death Statistical Master Files.

*Rates per 100,000 population. Age-adjusted to the 2000 U.S. standard population.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Age-Adjusted Stroke Mortality Rates*

1996–98



Data source: California Department of Health Services, Vital Statistics Death Statistical Master Files.

*Rates per 100,000 population. Age-adjusted to the 2000 U.S. standard population.

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Heart Disease Mortality Rates by County, 1996–98

Rank Order	County	Age-Adjusted Mortality Rate* (per 100,000)
1	SAN BERNARDINO	278.67
2	ALPINE	**259.67
3	STANISLAUS	250.30
4	KERN	249.36
5	LOS ANGELES	243.69
6	INYO	243.23
7	ORANGE	235.64
8	RIVERSIDE	233.10
9	SACRAMENTO	226.45
10	YUBA	225.48
11	KINGS	218.77
12	TULARE	217.84
	CALIFORNIA	214.77
13	SAN JOAQUIN	211.23
14	LAKE	209.16
15	SUTTER	207.25
16	MERCED	205.02
17	FRESNO	202.37
18	SAN DIEGO	202.28
19	ALAMEDA	199.76
20	SOLANO	198.24
21	MENDOCINO	197.18
22	PLACER	197.13
23	SANTA CLARA	195.19
24	NAPA	195.00
25	SHASTA	194.29
26	AMADOR	193.54
27	HUMBOLDT	190.37
28	SAN LUIS OBISPO	189.75
29	MONO	186.01
30	CONTRA COSTA	185.53
31	VENTURA	183.88
32	SAN FRANCISCO	181.10
33	SONOMA	180.37
34	YOLO	177.56
35	MADERA	177.17
36	IMPERIAL	172.49
37	SANTA BARBARA	172.20
38	SISKIYOU	170.30
39	MONTEREY	170.07
40	COLUSA	169.78
41	TEHAMA	168.67
42	DEL NORTE	168.04
43	SAN MATEO	167.57
44	TUOLUMNE	166.89
45	SANTA CRUZ	165.66
46	MARIN	160.07
47	GLENN	158.82
48	MODOC	158.16
49	TRINITY	155.15
50	EL DORADO	155.09
51	NEVADA	153.38
52	BUTTE	151.14
53	CALAVERAS	149.07
54	LASSEN	148.29
55	MARIPOSA	141.03
56	PLUMAS	136.73
57	SAN BENITO	122.40
58	SIERRA	114.77

Data source: California Department of Health Services, Vital Statistics Death Statistical Master Files.

*Age-adjusted to the 2000 U.S. standard population.

**Statistically unreliable.

Stroke Mortality Rates by County, 1996–98

Rank Order	County	Age-Adjusted Mortality Rate* (per 100,000)
1	SOLANO	77.67
2	KINGS	76.92
3	YUBA	76.19
4	LAKE	75.50
5	MERCED	74.48
6	SONOMA	73.90
7	SUTTER	73.58
8	SAN JOAQUIN	72.73
9	MARIN	72.48
10	CONTRA COSTA	72.13
11	INYO	71.05
12	TULARE	70.75
13	TEHAMA	69.43
14	SACRAMENTO	69.33
15	NAPA	68.46
16	SAN MATEO	68.08
17	MENDOCINO	67.67
18	SISKIYOU	67.36
19	ALAMEDA	67.28
20	FRESNO	67.16
21	STANISLAUS	66.78
22	HUMBOLDT	66.55
23	YOLO	65.80
24	BUTTE	65.62
25	MONTEREY	64.59
26	ORANGE	64.28
27	PLACER	64.12
28	CALAVERAS	63.63
29	IMPERIAL	62.32
30	SANTA CLARA	62.30
	CALIFORNIA	61.48
31	VENTURA	61.48
32	SAN DIEGO	60.63
33	COLUSA	60.45
34	EL DORADO	59.88
35	SANTA BARBARA	59.77
36	SAN LUIS OBISPO	58.96
37	SAN BERNARDINO	58.19
38	LOS ANGELES	57.11
39	SANTA CRUZ	56.72
40	SAN FRANCISCO	56.49
41	SHASTA	56.03
42	DEL NORTE	55.59
43	NEVADA	55.16
44	TRINITY	54.58
45	RIVERSIDE	53.79
46	AMADOR	53.39
47	KERN	53.30
48	TUOLUMNE	52.46
49	SAN BENITO	51.30
50	GLENN	51.07
51	MODOC	49.00
52	MARIPOSA	47.77
53	MADERA	47.15
54	PLUMAS	40.90
55	SIERRA	**34.48
56	LASSEN	30.80
57	MONO	**30.00
58	ALPINE	0

Data source: California Department of Health Services, Vital Statistics Death Statistical Master Files.

*Age-adjusted to the 2000 U.S. standard population.

**Statistically unreliable.

Resources and Contact Information



State Resources

California Department of Health Services
<http://www.dhs.ca.gov>

Division of Chronic Disease and Injury Control
California Department of Health Services
601 North 7th Street, MS 504
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 445-1102
Fax: (916) 445-0238
<http://www.dhs.ca.gov/ps/cdic/cdicindex.htm>

Chronic Disease Control Branch
California Department of Health Services
601 North 7th Street, MS 725
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 327-6985
Fax: (916) 324-7764
E-mail: cdcb@dhs.ca.gov
<http://www.dhs.ca.gov/ps/cdic/cdcb/Branch>

Chronic Disease Epidemiology and Control Section
California Department of Health Services
601 North 7th Street, MS 725
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 323-2750
Fax: (916) 324-7764
<http://www.dhs.ca.gov/ps/cdic/cdcb/chronic>

California Heart Disease and Stroke Prevention Program
California Department of Health Services
601 North 7th Street, MS 725
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 324-1329
Fax: (916) 324-7764
E-mail: heart@dhs.ca.gov
<http://www.dhs.ca.gov/heart>

California Nutrition Network for Healthy, Active Families
California Department of Health Services
601 North 7th Street, MS 662
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 323-0594
<http://www.dhs.ca.gov/cpns/network/index.html>

California 5 A Day Campaign
California Department of Health Services
Cancer Prevention and Nutrition Section
601 North 7th Street, MS 662
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 323-0594
<http://www.dhs.ca.gov/cpns/ca5aday/index.html>

California Obesity Prevention Initiative
California Department of Health Services
601 North 7th Street, MS 675
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 445-7054
Fax: (916) 324-7763
Email: glyons@dhs.ca.gov

California Project LEAN (Leaders Encouraging Activity and Nutrition)

California Department of Health Services
P.O. Box 942732, MS 675
Sacramento, CA 94234-7320
(916) 323-4742
Fax: (916) 445-7571
<http://www.dhs.ca.gov/lean>

Diabetes Control Program

California Department of Health Services
601 North 7th Street, MS 675
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 445-2547
Fax: (916) 324-7764
E-mail: diabetes@dhs.ca.gov
<http://www.dhs.ca.gov/diabetes>

Physical Activity and Health Initiative

California Department of Health Services
601 North 7th Street, MS 675
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 324-2233
Fax: (916) 324-7763
<http://nurseweb.ucsf.edu/iha/pahi>

Tobacco Control Section

California Department of Health Services
P.O. Box 942732, MS 555
Sacramento, CA 94234-7320
(916) 327-5425
<http://www.dhs.ca.gov/tobacco>

National Resources

Agency for Healthcare Research and Quality

2101 E. Jefferson Street, Suite 501
Rockville, MD 20852
(301) 594-1364
E-mail: info@ahrq.gov
<http://www.ahrq.gov>

American College of Cardiology

Heart House
9111 Old Georgetown Road
Bethesda, MD 20814-1699
(800) 253-4636, ext. 694 or (301) 897-5400
Fax: (301) 897-9745
<http://www.acc.org>

American Diabetes Association

1701 North Beauregard Street
Alexandria, VA 22311
1-800-DIABETES
<http://www.diabetes.org>

American Heart Association

National Center
7272 Greenville Avenue
Dallas, TX 75231
1-800-AHA-USA-1 or 1-800-242-8721
<http://www.americanheart.org>

American Heart Association, Western States Affiliate

1055 Wilshire Boulevard, Ninth Floor
Los Angeles, CA 90017
(213) 580-1408
Fax: (213) 580-1463
<http://www.heartsources.org>

American Stroke Association

National Center
7272 Greenville Avenue
Dallas, TX 75231
1-888-4-STROKE or 1-888-478-7653
<http://www.strokeassociation.org>

Centers for Disease Control and Prevention

1600 Clifton Road
Atlanta, GA 30333
(404) 639-3311
Public Inquiries:
(404) 639-3534
(800) 311-3435
<http://www.cdc.gov>

Cardiovascular Health Program

<http://www.cdc.gov/nccdphp/cvd>

**Guide to Community Preventive Services
(The Community Guide)**

Community Guide Branch
Division of Prevention Research and Analytic Methods
Epidemiology Program Office
Centers for Disease Control and Prevention
4770 Buford Highway, Mailstop K-73
Atlanta, GA 30341
(770) 488-8189
Fax: (770) 488-8462
<http://www.thecommunityguide.org>

**National Center for Chronic Disease Prevention
and Health Promotion**

<http://www.cdc.gov/nccdphp>

Healthy People 2010

<http://www.health.gov/healthypeople>

National Institutes of Health

<http://www.nih.gov>

National Cholesterol Education Program

NHLBI Health Information Network

P.O. Box 30105

Bethesda, MD 20824-0105

(301) 592-8573

Fax: (301) 592-8563

<http://www.nhlbi.nih.gov/about/ncep/index.htm>

National Diabetes Education Program

National Institute of Diabetes and Digestive
and Kidney Diseases

National Institutes of Health

(301) 496-3583

<http://www.ndep.nih.gov>

National Heart Attack Alert Program

NHLBI Health Information Network

P.O. Box 30105

Bethesda, MD 20824-0105

(301) 592-8573

Fax: (301) 592-8563

<http://www.nhlbi.nih.gov/about/nhaap/index.htm>

National Heart, Lung, and Blood Institute

<http://www.nhlbi.nih.gov>

National High Blood Pressure Education Program

NHLBI Health Information Center

P.O. Box 30105

Bethesda, MD 20824-0105

(301) 592-8573

Fax: (301) 592-8563

<http://www.nhlbi.nih.gov/about/nhbpep/index.htm>

**National Institute of Diabetes and Digestive
and Kidney Diseases**

<http://www.niddk.nih.gov>

National Institute of Neurological Disorders and Stroke

<http://www.ninds.nih.gov>

National Stroke Association

9707 E. Easter Lane

Englewood, CO 80112

Toll free: 1-800-STROKES

(303) 649-9299

Fax: (303) 649-1328

<http://www.stroke.org>

Nutrition and Your Health: Dietary Guidelines for Americans

U.S. Department of Agriculture

<http://www.health.gov/dietaryguidelines>

U.S. Department of Health and Human Services

200 Independence Avenue, S.W.

Washington, DC 20201

Toll Free: 1-877-696-6775

<http://www.hhs.gov> or <http://www.os.dhhs.gov>

Office of Disease Prevention and Health Promotion

<http://odphp.osophs.dhhs.gov>

Office of Public Health and Science

<http://www.surgeongeneral.gov/ophs>

Office of the Surgeon General

<http://www.surgeongeneral.gov>



Appendices



Appendix 1: Methods

Population Data

Population estimates for California were obtained from the California Department of Finance, Demographic Unit. National population estimates were obtained from CDC Wonder (<http://wonder.cdc.gov>), an on-line data resource provided by the Centers for Disease Control and Prevention (CDC). For this report, population estimates from specific years served as denominator data to calculate mortality rates and hospitalization rates.

Race/Ethnicity

Four categories were used to define race/ethnicity. They include non-Hispanic white, non-Hispanic black, Hispanic (all races), and non-Hispanic Asian/Pacific Islander. Persons of Native American, other, or unknown race/ethnicity are excluded from race/ethnic-specific data in this report due to the small number of events (i.e., deaths or hospitalizations) observed in these populations, however they are included in data for all race/ethnic groups combined.

Rates for specific race/ethnic groups are not presented for years prior to 1985 because mutually exclusive data for whites and Hispanics were not available.

Age-Adjustment

Age-adjustment is a statistical process that standardizes a population to a specific age distribution allowing for the comparison of statistics across different years and different populations. Most diseases and health outcomes occur at different rates in different age groups. For example, heart disease and stroke occur more often among older people. When comparisons are made between populations with different age distributions and the risk of the disease or health outcome varies across age groups, it is important to age-adjust to remove the effect of age on the relationship between a risk factor and a disease or health outcome.

Age-adjustments were conducted using the 2000 U.S. standard million population estimates obtained from the National Center for Health Statistics.

For risk factor data (BRFSS data), age-adjustments are based on the following age categories: 18–44 years, 45–54 years, 55–64 years, 65–74 years, and 75 years and older.

For mortality (California Vital Statistics data) and hospitalization data (OSHPD data), age-adjustments are based on the following age categories: under 1 year, 1–4 years, 5–14 years, 15–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years, 75–84 years, and 85 years and older.

Risk Factor Data

In order to estimate the prevalence of key risk factors for heart disease and stroke, data from the California Behavioral Risk Factor Surveillance System (BRFSS) were used. This system is an ongoing collaborative effort of the California Department of Health Services (CDHS), the Public Health Institute, and CDC. The Survey Research Group of the CDHS' Cancer Surveillance Section conducts the survey.

The California BRFSS is an ongoing telephone survey of randomly selected California residents who are 18 years of age or older. Each year, several thousand individuals are selected and surveyed on a wide variety of health-related behaviors.

Prevalence estimates of risk factors presented in this report were estimated from these samples. Converting sample statistics to state-level estimates requires "weighting" to account for the respondents' probability of selection into a sample and adjustments to make estimates representative of the 1990 California population. The adjustments applied for this report are based on (1) the number of adults in the household and the number of unique telephone numbers in the household and (2) the number of the California population in strata defined by two sexes, four race/ethnic groups (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other), and six age groups. We applied an additional adjustment to the prevalence estimates based on the difference in age distribution between the 1990 California population and the 2000 U.S. population.

Mortality Data

Mortality data for California were obtained from the Center for Health Statistics, Office of Health Information and Research, Vital Statistics Section of the CDHS. Information included in these records was based on details reported on death certificates that were filed with the Office of Vital Records. Descriptive information about the decedent such as gender, race/ethnicity, and age was obtained from the death certificate, along with the

year of death and the place of the deceased's residence. The death records of those who were residents of California at the time of death were used in this analysis. National death data were obtained from the National Center for Health Statistics at CDC.

The underlying cause of death was based on the Ninth Revision of the International Classification of Diseases¹ (ICD-9) for the years 1979–98. The implementation of the Tenth Revision of the International Classification of Diseases² (ICD-10) began with deaths occurring in 1999. There are several differences between ICD-10 and ICD-9. ICD-10 includes far more detail with about 8,000 categories for classifying causes of deaths compared with about 5,000 in ICD-9. ICD-10 uses a four-digit alphanumeric coding system rather than the four-digit numeric system used in ICD-9. Chapters of the ICD have been added and rearranged; cause-of-death titles have been changed and regrouped; and some of the coding rules and rules for selecting the underlying cause of death have been changed.³

The effect of implementing the ICD-10 on mortality statistics has been studied and explained in a previous report released by CDC's National Vital Statistics System (NVSS).³ This NVSS report presents results describing the effects of implementing the ICD-10 on mortality statistics. Comparability ratios were calculated to measure the discontinuities that develop when transitioning between the implementation of ICD-9 and ICD-10. The comparability ratio for cerebrovascular diseases is 1.0588, indicating a net increase of almost six percent in the allocation of cerebrovascular diseases as the underlying cause of death with the implementation of ICD-10.

One notable change in ICD-10 is related to cerebrovascular diseases. For deaths occurring in 1979–98, transient ischemic attacks (TIA) were included as a cause of death under cerebrovascular diseases (ICD-9 code 435). However, ICD-10 has moved TIA from "cerebrovascular diseases" to "diseases of the nervous system" (ICD-10 codes

G45.8 and G45.9). In this report, state and national deaths occurring in 1999 do not include TIA in stroke mortality data. The impact of this change on stroke mortality rates is negligible. This is because the number of deaths attributed to TIA is quite small.

For this report, ICD codes were based upon those used in Healthy People 2010.⁴ Deaths due to heart disease were defined by ICD-9 codes of 402 (hypertensive heart disease), 410–414 (ischemic heart disease), and 429.2 (cardiovascular disease, unspecified). Heart disease death rates for 1999 were defined by ICD-10 codes of I11 (hypertensive heart disease) and I20–I25 (ischemic heart diseases). Diseases listed in parentheses reflect the terminology used in the ICD-9 and ICD-10.

Deaths due to heart failure (ICD-9 code 428) are described within Appendix 2. Heart failure deaths occurring in 1999 were defined by the ICD-10 code I50 (heart failure).

Deaths due to stroke were defined by ICD-9 codes of 430–438 (cerebrovascular disease). Stroke deaths for 1999 were defined by ICD-10 codes I60–I69 (cerebrovascular diseases).

Hospital Discharge Data

Hospital discharge data were obtained from the Office of Statewide Health Planning and Development (OSHPD). People who were residents of California at the time of discharge were included in these analyses.

The term “hospitalizations” replaces the OSHPD term “hospital discharges.” All hospitalizations were considered, whether the status of the patient at discharge was alive or deceased. The diagnosis given at discharge, not at admission, was used. The primary (underlying) diagnosis listed in the patient’s medical record was used. The same ICD-9 codes as those used to define cause of death (see “Mortality Data”) were used to categorize the primary diagnosis for each hospitalization based upon the International Classification of Diseases, Clinical Modification (ICD-9-CM).⁵ The ICD-9-CM, which is a clinical modification of the

ICD-9, is used to code morbidity data and is compatible with the ICD-9. Unlike mortality data, the implementation of ICD-10 codes for coding hospital discharges was not in effect for 1999 hospitalization data.

Data on hospitalizations due to heart failure are presented in Appendix 2. A diagnosis of heart failure was defined by the ICD-9 code 428.

There is no distinction between patients who were hospitalized multiple times from those who were hospitalized only once in the given time frame (1999). Thus, each hospitalization is considered a unique event and counted accordingly in the OSHPD data.

Maps

Maps were generated with ESRI ArchView GIS Version 3.2. Three-year average rates for mortality (1996–98) and hospitalizations (1997–99) were mapped for each of the 58 counties in California. Death and hospitalization rates were mapped for heart disease and stroke separately. ICD-9 codes were used to categorize deaths and hospitalizations (see codes above). In order to create average rates across three-year periods, it is necessary to have data that utilize the same ICD codes. Thus, the more recent 1999 mortality data were not included in the three-year average due to the change from ICD-9 to ICD-10 codes.

There are also three city health jurisdictions in California (Berkeley, Long Beach, and Pasadena). The data from these city health jurisdictions are included in the rates for the counties in which they are incorporated. Mortality and hospitalization data were not available by city of residence, only by county. Thus, it was not possible to calculate rates for the city health jurisdictions.

Some counties’ data are indicated as “statistically unreliable.” Counties’ data are classified as “statistically unreliable” if the relative standard error of the rate is greater than 0.30. The relative standard error is calculated by dividing the standard error of the rate by the rate itself.

All rates applied in the maps were age-adjusted using the 2000 U.S. standard million population estimates. Mortality rates are presented as deaths per 100,000 population. Hospitalization rates are presented as hospitalizations per 1,000 population.

On each map, counties were grouped into five categories of approximately equal number (quintiles) based on the county distribution of either death rates or hospitalization rates. Counties were first ranked from lowest to highest based on either death rates or hospitalization rates. The counties in the lowest 20 percent were assigned to the first quintile; the counties in the next highest 20 percent were assigned to the second quintile and so forth. The range of values represented by a given quintile varies from map to map.

References

1. World Health Organization. Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Based on the Recommendations of the Ninth Revision Conference. Geneva, Switzerland: World Health Organization, 1977.
2. World Health Organization. International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. Geneva, Switzerland: World Health Organization, 1992.
3. Anderson RN, Miniño AM, Hoyert DL, Rosenberg HM. Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates. National vital statistics reports; vol 49 no. 2. Hyattsville, Maryland; National Center for Health Statistics, 2001.
4. U.S. Department of Health and Human Services. Healthy People 2010 (Conference Edition, in Two Volumes). Washington, DC: January 2000.
5. U.S. Department of Health and Human Services. International Classification of Diseases, Ninth Revision, Clinical Modifications. 6th ed. Washington, DC: HHS Publication No. 96-1260. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Health Care Financing Administration, 1997.

Appendix 2: Heart Failure Surveillance Data

As described in the Methods section (Appendix 1), this report is designed to follow the same definitions of heart disease and stroke as those applied in Healthy People 2010. Deaths due to heart failure are not included in the Healthy People 2010 indicator for deaths due to heart disease. However, since heart failure is included in the definition of cardiovascular disease or heart disease by other organizations such as CDC, the American Heart Association, and the Council of State and Territorial Epidemiologists, surveillance data for hospitalizations and deaths due to heart failure are included here.

Heart Failure Hospitalization Rates, California, 1999

Rate*	Heart Disease Discharges	Hospitalization Rates (per 1,000)	
		Crude Rate	Age-adjusted
Total	79,879	2.3	2.7
Age			
0-44	3,086	0.1	—
45-64	15,048	2.2	—
65-84	44,839	13.9	—
85+	16,906	39.4	—
Sex			
Male	37,665	2.2	3.1
Female	42,209	2.5	2.5
Race/Ethnicity			
White	52,812	3.0	2.6
Black	8,971	3.9	5.5
Hispanic	12,179	1.2	2.8
Asian/Pacific Islander	4,237	1.1	1.6

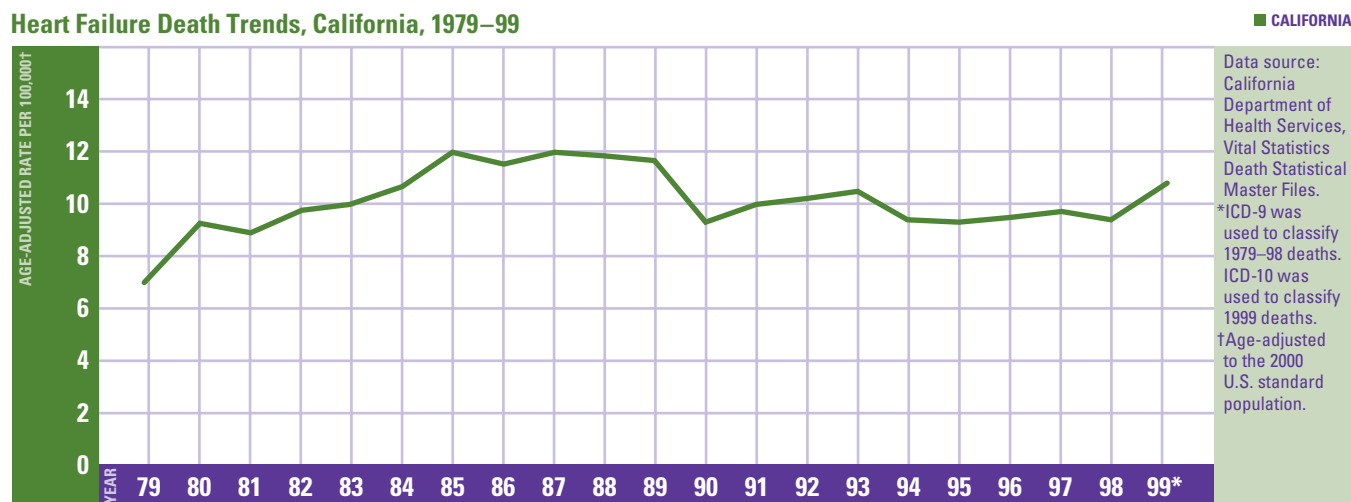
Data source: Office of Statewide Health Planning and Development.

*Age-adjusted to the 2000 U.S. standard population

Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

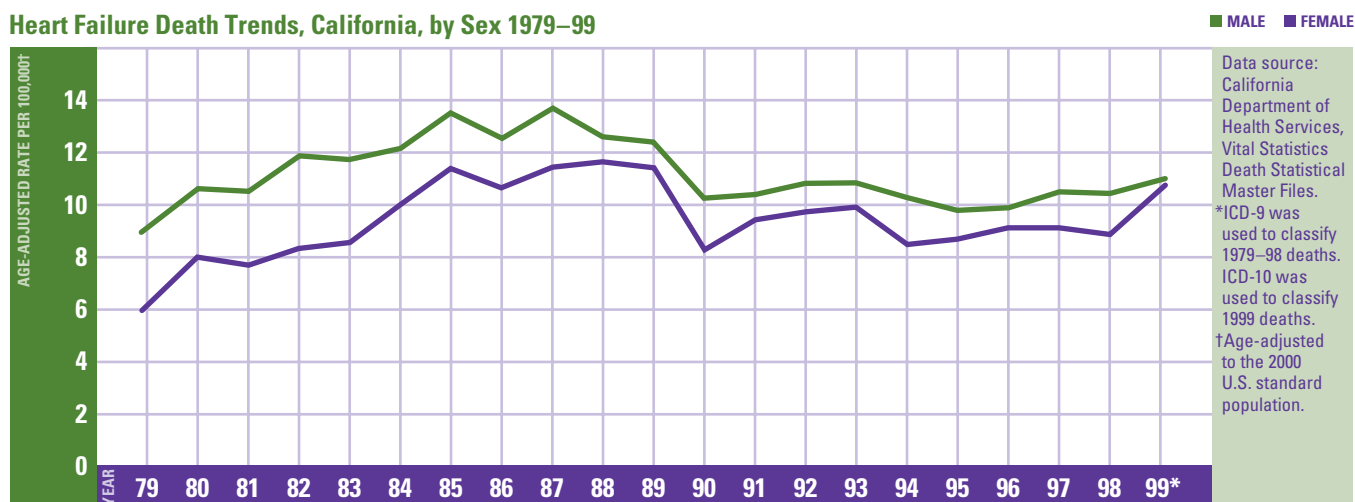
Heart Failure Death Rates

Heart Failure Death Trends, California, 1979–99



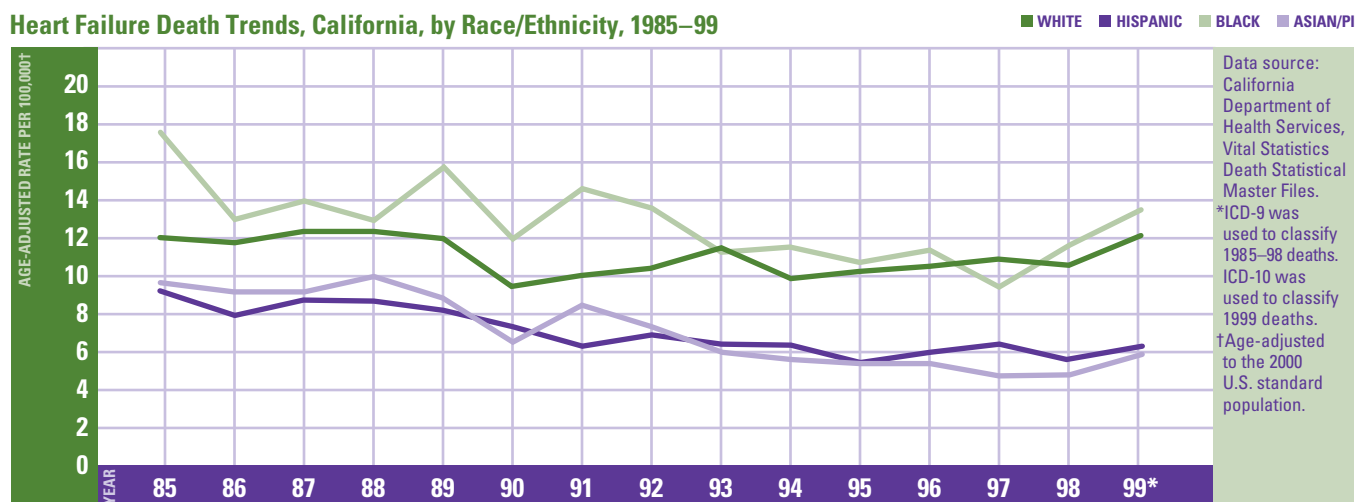
Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Heart Failure Death Trends, California, by Sex 1979–99



Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Heart Failure Death Trends, California, by Race/Ethnicity, 1985–99

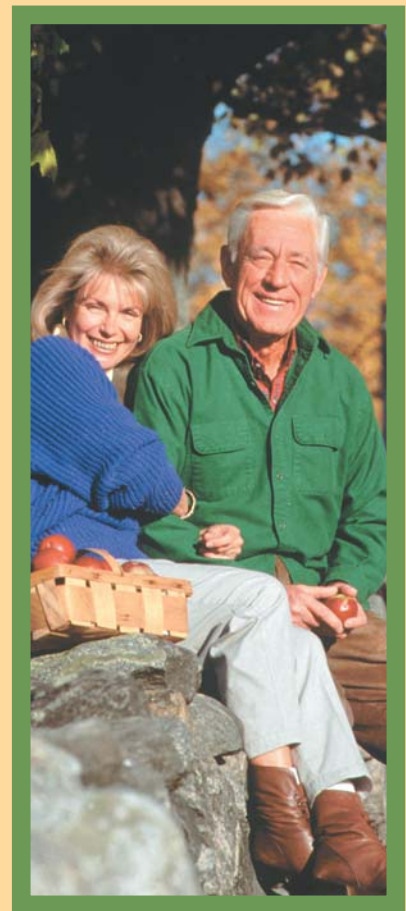


Prepared by the California Department of Health Services, Chronic Disease Epidemiology and Control Section

Appendix 3:

Map of California Counties





*Chronic Disease
Epidemiology and
Control Section*

